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PRIME ITEM DEVELOPMENT SPECIFICATION FOR DIGITAL MESSAGE DEVICE-ETC(U)
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Specification Number/EL-SS-2603-TF Code Ident 80063 7 April 1975 13. 292 P.7 LEVELIV PRIME ITEM DEVELOPMENT SPECIFICATION FOR DIGITAL MESSAGE DEVICE (DMD) TACTICAL FIRE DIRECTION SYSTEM (TACFIRE) DAAB07-76-2-1677

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Specification Number EL-SS-2603-TF Code Ident 80063 7 April 1975

PRIME ITEM DEVELOPMENT SPECIFICATION

FOR

DIGITAL MESSAGE DEVICE (DMD)

FOR

TACTICAL FIRE DIRECTION SYSTEM (TACFIRE)

JTABLES / Pages FIGURES / Eges VI Keyboard Char/121 1. TF Sys Diag / 115 2. DMD Opn ikolles / 116 J. DMO Info. Trans/122 3 Sata Ms Formal/117 3. ACK/NAK FOX-DOMD/135 4. DAID Into Trans/ 118 4. Auto ACK/ 136 5. Suigh/Double Blk Thans/119 5. Initialization Defaut Volus /137 6. TDC/118 7. Leser Input 120 Test Squence/48

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DRCPM-TDS-LO DRCPM-TDS-SE DRCPM-TDS-PA DRC PA-TDS-PPA DRCTM-TDS-PPO DRCPM-TDS-RA

page Changes 8-29/30

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14 April 1977

Department of the Army Project Hanager, Army Tactical Data Systems Fort Rommouth, New Jersey 07703

Attention: DRCPM-TDS-CM, Mr. G. Ring

Subject: Contract Number DAABO7-76-C-1677-DMD

Reference: ARTADS Correspondence DRCPM-TDS-CM

dated 23 March 1977 w/encls.

Gentlemen:

Engineering Change Proposal Numbers 004Rl. 005, 006, 007, 008, 009 and 010, applicable to the subject contract, were approved by the referenced correspondence.

To finalize remaining requirements and in keeping with obligations of Contract Clause J23(b), twenty-five (25) copies of Specification Change Notice, DD Form 1696, for each mentioned ECP is enclosed.

If Hagnavox can be of further assistance, please advise.

Very truly yours,

R. G. Campbell

Contract Administrator Sensor & Signal Processing

Operation

RGC/ck

Enc.: As Stated

cc: ARTADS - Attn: DRCPM-TDS-TF, LTC R. E. Oswandel w/encl.

ECOM - Attn: DRSEL-PP-C-ES-4(GAB) w/encl.

DCASMA - Attn: DCRI-GFCA/TER w/encl. DCRI-GFPE/EVM w/encl.

DIGITAL MESSAGE DEVICE

(DMD)

1. SCOPE

1.1 This specification establishes the requirements for performance, design, fabrication and test of a Digital Message Device, herein referred to as the DMD. This device shall be used by the Forward Observer to transmit and receive tactical digital messages over standard Army tactical communications equipment as part of the Tactical Fire Direction System (TACFIRE).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification. In the event of conflict between documents referenced herein and other detailed contents of this specification, the detail requirements of this specification shall be considered a superseding requirement.

SPECIFICATIONS

Military

MIL-P-116	Preservation, Methods of		
MIL-E-4158E	Electronic Equipment, Ground Requirements for		
MIL-P-9024	Packaging, Materiels Handling, and Transportability System and System Segments, General Specification of		
MIL-Q-9858	Quality Program Requirements		
MIL-P-11268	Parts, Materials and Processes Used in Military Electronics Equipment		
MIL-M-13231	Marking of Electronic Items		

MIL-F-14072 Finishes for Ground Signal Equipment

MIL-I-19590 Marking of Commodities and Containers to Indicate Radioactive Material

MIL-S-22710 Switch, Rotary (Printed Circuit), General Specification for

MIL-H-46855 Human Engineering Requirements for Military Systems, Equipment and Facilities

Electronics Command

EL-SS-2604-TF Tempest Requirements for the Digital (Secret) Message Device (DMD)

EI-CP-00041109B CEI Specification for Data Terminal Unit (DTU) for Fire Direction System, Artillery AN/GSG-10()(V)

STANDARDS

Federal

FED-STD-102 Preservation, Packaging, and Packing Levels
FED-STD-595 Color

Military

MIL-STD-129

Marking for Shipment and Storage

MIL-STD-188

Military Communication System Technical Standards

MIL-STD-252

Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices

MIL-STD-415D

Test Provisions for Electronic Systems and Associated Equipment, Design Criteria for

MIL-STD-454 Standard General Requirement for Electronic Equipment

MIL-STD-461A Electromagnetic Interference Characteristics, Requirements for Equipment

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Measurement of Electromagnetic Interference MIL-STD-462 Characteristics Maintainability Program Requirements for MIL-STD-470 Systems and Equipments Maintainability Demonstration MIL-STD-471 Reliability Prediction MIL-STD-756 Reliability Tests, Exponential Distribution MIL-STD-781 Reliability Program for Systems and Equipment MIL-STD-785 Development and Production Environmental Test Methods MIL-STD-810 Electrical Circuit, 28 Volt DC, Transient Char MII-SID-1275 Human Engineering Design Criteria for MIL-SID-1472 Military Systems, Equipment and Facilities

Publications

FM 3-10B(C)

Maintainability Guide for Design AMCP-706-134 Reliability Stress and Failure Rate MIL-HDBK-217

Data for Electrical Fquipment Maintainability Prediction MII-HDBK-472

Maintenance of Supplies and Equipment USAECOM Direc-Maintenance Evaluations torate of Maintenance Memo 750-5

Employment of Chemical Agents FM 3-10 Employment of Chemical Agents

Chemical, Biological, Radiological 1 3-220 Decontamination

Freezing Rain Test MTP-5-2-591

Half-Duplex, Wideband, Speech Security NSA CSEEB-6A TSEC/KY-8 Equipment (U)

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NSA CSEEB- 13C TSEC/KY-28 Speech Security Equipment, Half-Duplex, Wideband, Air Borne (U)

NSA CSEEB- 18A TSEC/KY-38 Speech Security Equipment, Half-Duplex, Wideband, Portable (U)

National Electric Codes (NFPA 70-1971)

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies).

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3. REQUIREMENTS

- 3.1 ITEM DEFINITION. The DND shall be a small, lightweight, source data automation device to allow tactical units to transmit and receive digital messages.
- 3.1.1 Employment. The DND will be employed in TACFIRE (See para 6.1) as the forward observers input/output device. In this capacity, the DMD shall be highly human factors oriented with automatic prompting of the operator through message composition, and through review of both composed and received messages. The DMD shall provide ease of effective operation under periods of extreme combat stress. Figure 1 is a block diagram illustrating a typical employment of the DMD in a Battalion TACFIRE. To accomplish its mission, the DMD shall operate with that standard Army tactical communications equipment shown in Figure 2. Connections shall be via cables furnished with each DMD as shown in Figure 2. Each DMD shall transmit and receive addressed messages to and from other DMD's and Digital Data Terminals (DDT's) Spec No.EL-CF-COC41109B of TACFIRE by interfacing in accordance with 3.1.4.
- 3.1.2 Formats. The DMD shall store and retrieve the message formats of TACFIRE shown in Appendix 1. All formats shall be stored and displayed electronically. The DMD shall allow replacement of formats and data elements at DS level maintenance.
- 3.1.3 Operational Constraints. The DMD shall be operable in 10 3 to 10 ft candles ambient illumination with the operator wearing protective clothing

including protective mask and five-finger gloves. No external source of light shall be required. In addition, the DMD shall be capable of hand held operation while being transported on foot.

- 3.1.4 <u>Interface</u>. The DMD shall transmit and receive over standard Army Tactical Communications equipment shown in Figure 2 with DMD connection cabling only.
- 3.1.4.1 <u>Cables</u>. The following cables, built to MIL-F-11268, shall be provided by the contractor. One end of each cable shall have a connector which mates with the appropriate connector on the DMD.

 3.1.4.1.1 Power Cables.
- a. Cable three feet (+2 inches) long for use with external batteries if these batteries are used for operation of the DMD below OFF (3.2.2.1.2).
- b. Cable six feet (+2 inches) long with vehicular battery alligator clamps.
- c. Cable six feet (+2 inches) long to connect the DMD to a vehicular receptacle power source. Male connector on the cable shall mate with: Connector, receptacle, electrical, NSN 2590-321-6209. Z 3.1.4.1.2 Communications Cables
- a. Cable, four feet (± 2 inches) long to connect the DMD with the standard 5-pin audio connector of the type used on the AN/VRC-12, AN/PRC-25 and AN/PRC-77 radios, or AN/GRA-39 (plug, 5 pin audio cable mounted U229/U, NSN5935-992-2035).
- b. Cable, four feet (+2 inches) long to connect the DMD with the standard 10-pin audio connector of the type used on the AN/GRC-106 radio (plug, 10 pin audio cable mounted U77/U, NSN5935-283-2950).
- c. Y-type cable, three feet (+ 2 inches) long to connect the DMD, pilot's helmet (e.g. SPH-4), and aircraft audio plug (e.g. U-94A/U or

U-92A/U).

- d. Cable, six feet (± 2 inches) long to connect the DMD with the GLLD (GLLD connector, NSN 5935-328-0666).
- 3.1.4.2 Security. The DMD shall interface with the TSEC/KY-8, TSEC/KY-28 via aircraft intercom system, and TSEC/KY-38.
- 3.1.5 Modularity.
- 3.1.5.1 <u>Definition</u>. The DMD shall be designed and constructed so that the electronic circuitry for decoding received messages and encoding messages for transmission be removable by use of plug-in modules which can be replaced at Direct Support Maintenance level with no calibration or adjustment to the basic DMD. The logical interpretation of message formats and data elements for both composition and received message display shall be contained in a single module. It is desired, but not required, that EDC (3.2.1.5.7), TDC (3.2.1.5.9), and single/double block (3.2.1.5.8) logic be included in the format/data-element module or a separate single module. It is desired, but not required, that the modem be included in the EDC/TDC module.
- 3.1.5.2 <u>Partitioning.</u> Firmware operating sequences, message formats, data elements, and prompters shall be partitioned in a manner which allows addition, modification, or deletions to data elements or formats at minimum cost in components and labor to implement the change to existing modules.

3. 2. CHARACTERISTICS

- 3. 2. 1 Performance. The DMD shall enter, edit, transmit, receive and display alphanumeric messages and acknowledgements and non-acknowledgements.
- 3. 2. 1.1 <u>Keyboard</u>. The DMD shall have a keyboard which allows the operator to enter the characters shown in Table 1. Legibility shall confirm with 3. 2. 1. 11.
- 3. 2. 1. 1. 1 Bounce. The DMD keyboard shall not exhibit observable effects of electrical switching bounce.
- 3. 2. 1. 1. 2 <u>Lighting and Control</u>. There shall be night illumination of the DMD keyboard and it shall be evenly distributed and continuously adjustable from detent off to full-brightness(3. 2. 1. 10. 1.1).
- 3. 2. 1. 1. 3 Pressure. The pressure required to activate the DMD keyboard shall be 13+3 ounces.
- 3. 2. 1. 2. <u>Display</u>. The DMD shall display both composed and received messages and initialization data. It is preferred that the entire message be displayed at one time; however, sequential display is acceptable. In both cases, the display shall include name of message type, field names and data entry names. Legibility shall conform with 3. 2. 1. 11.
- 3. 2. 1. 2. 1. Configuration. DMD displayed characters shall be formed by dot matrices whose dimensions are 5 x 7 or greater. The ratio of character width to height shall be at least 1:2 and no greater than 1:1. Spacing between characters shall be no less than 2/5 the character width.
- 3. 2. 1. 2. 2. Turn Off. The DMD display shall not be extinguished automatically

in less than 20 sec. The DMD shall allow the operator to extinguish the display at any time without removing power from the DMD.

- 3.2.1.2.3 <u>Return.</u> After the DMD display times out or is extinguished, upon operator action the display shall be activated at the same point in the operational sequence as when the display timed out or was extinguished.
- 3.2.7.2.4 <u>Brightness Control</u>. A control shall be provided on the DMD to permit continuous adjustment from a detent off to full brightness of alphanumeric display elements and operator signals (3.2.1.9, 3.2.1.10.1.1), except for the MSG lamps as noted in paragraph 3.2.1.9.1.1.
- 3.2.1.3 <u>Initialization.</u> Initialization of the DMD shall include all actions from application of power until the DMD is ready to conduct an operational mission.

 Initialization shall be accomplished in less than 2 minutes.
- 3.2.7.3.1 DMD Address. The DMD shall be addressed uniquely by a sender. Each DMD shall provide for the selection of its unique address from the characters p-9 and A-Z (use Table 1). This character shall be transmitted in the sixth character position in the standard message header shown in Figure 3. It shall be indicated visually in an alphanumeric display space. This address shall be operator changeable within 10 seconds.
- 3.2.1.3.2 <u>Destination Address</u>. The DMD shall send its messages to unique addresses. Such destination addresses shall be the first character in the standard message header shown in Figure 3. Destination addresses

shall be selected from the characters p - 9 and A - Z (use Table 1) and shall be operator changeable within 10 seconds.

- 3.2.1.3.3 <u>Test/Data Designator</u>. The DMD shall allow the operator to specify a one character test/data designator to be the fifth character in the standard message header shown in Figure 3. This designator shall be operator changeable in 10 seconds.
- 3.2.1.3.4 <u>Single/Double Block Transmission</u>. The DND shall allow the operator to select single or double block transmission (3.2.1.5.8). This selection shall be operator changeable in 10 seconds.
- 3.2.1.3.5 <u>Transmission Rate.</u> The DMD shall allow the operator to select a transmission rate of 600 or 1200 bits per second (3.2.2.2). This selection shall be operator changeable in 10 seconds.
- 3.2.1.3.6 <u>Preamble.</u> The DMD shall allow the operator to select a preamble which conforms with 3.2.1.5.2. This selection shall be operator changeable in 18 seconds.
- 3.2.1.3.7 <u>Setting Advance Delay.</u> The DMD shall allow the operator to select the advance delay time in accordance with 3.2.1.4.1.3. This selection shall be operator changeable in 10 seconds.
- 3.2.1.3.8 <u>Setting Audible Signals.</u> The DMD shall allow the operator to select the volume level of the audible signals for the keyboard feedback and message, ACK/NAK receipt. This selection shall be in accordance with 3.2.1.9.2 and each adjustment shall be operator changeable in 10 seconds.
- 3.2.1.4 Message Composition. The DMD shall enable the operator to compose and enter—
 any message described in Appendix 1 utilizing the characters shown in Table 1. Any
 unused character positions shall be filled with the ASC II space character code.

- 3.2.1.4.1 Operator Prompting. The DMD shall prompt the operator through the composition of the message. During composition, it is not necessary to display the entire message; one field at a time is sufficient. It is desired that the operator be able to stop composing and view all data previously entered at any point in the composition sequence, then return to the same point and resume composition.
- 3.2.1.4.1.1 <u>Ellegal Entries Prevented</u>. During composition all entries which are not legal entries (Appendix 1) shall be prevented automatically. 3.2.1.4.1.2 <u>Character Storage</u>. Once composition is initiated all characters entered in a composed message but not yet transmitted shall be stored in a way so that they are not disrupted or lost by reception of an incoming message.
- 3.2.1.4.1.3 Advance Delay. After the last entry in a field, the DMD shall display the last selection and pause before going on to the next field. This pause shall be variable, by operator adjustment, from zero to two seconds in 0.2 second increments.
- 3.2.1.4.1.4 Message Type in Summary. If a summary display, consisting of several message fields, is employed in the DMD, the DMD shall display the name of the message type simultaneously with the summary.
- 3.2.1.4.1.5 Character and Data Element Sequencing. Positioning of the next character or data element to be entered shall be automatically sequenced with the entry of each character or data element. The position of the next character or data element to be entered shall be positively

indicated to the operator and shall be changeable by the operator without destroying previously entered data.

3.2.1.4.1.6 Attitude. In the fixed format messages (Appendix 1) if either Radius/Length or Width is entered as NOT GIVEN the "ATTITUDE" field shall not be displayed, and the default value (Appendix 2) shall be entered for it.

3.2.1.4.1.7 Shift. Entry field SHIFT shall not be displayed as a single separate entry field. The SHIFT entry shall be determined by DED prompting of the operator in combination with selections for RIGHT/LEFT, ADD/DROP and UP/DOWN, in that order.

3.2.1.4.1.8 Target Type Not Given. It is preferred that during the DMD display of target types a 17th field, NOT GIVEN, be displayed. Selection of Target Type NOT GIVEN shall cause the display to skip target subtype and shall cause transmission of a target subtype "NOT GIVEN" and target type "PERSONNEL".

3.2.1.4.2 Authentication of Messages. During Message Composition the DMD shall place in positions 3 and 4 in the message header (Figure 3), a two-character authentication code selected by the operator. These characters shall be changeable to any of the characters \emptyset - 9 and Λ - Z. They shall be changeable to any desired code in 10 seconds. The authentication characters shall be entered during the composition sequence,

and shall be stored in memory until overwritten by operator entry of a new authentication code. The last authentication code entered in either fire mission sequence (3.2.1.4.3.2.1) shall be the authentication code displayed in the next composed or composition message display, regardless of any previously-entered or stored authentication codes.

3.2.1.4.3 Default Values. When a message format is called up, its fields shall have pre-entered default values. Some of these values are fixed (3.2.1.4.3.1) while others are dynamic (3.2.1.4.3.2). The DMD shall allow the operator to overwrite any of the default values during message composition. 3.2.1.4.3.1 Fixed. Fixed default values are shown in Appendix 2. 3.2.1.4.3.2 Dynamic. Dynamic default values shall depend upon previous entries by the operator or upon the contents of messages received by the DMD. The dynamic defaults and their source shall be as described in Figure 4 and Table 2 in conjunction with Appendix 2. 3.2.1.4.3.2.1 Two Fire Missions. The DAD shall store automatically two separate sets of retained entries, sufficient for two separate fire missions, and shall allow the operator to select either set to be active at any time. 'A fire mission consists of a fire request; subsequent adjustments EOM/Surveillance and a precision adjustment message pertaining to one target. The DMD shall give clear indication to the operator of which fire mission is active.

3.2.1.4.3.2.1.1 Active Fire Mission. The DMD shall allow the operator to switch from either one of the stored fire mission sequences to the other in 5 seconds.

3.2.1.4.3.2.1.2 Fire Mission Associated with Target Number. Each set of retained entries shall be associated with the Target Number of the Fire mission for that set. Character position 42 in the Message to Observer (MTO)

(Appendix 1) shall indicate which set (1 or 2) the MTO is associated with.

When a MTO is received the DMD shall associate the Target Number it contains with the appropriate set of retained Fire mission entries.

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3.2.1.4.3.2.2 High Burst Mean Point of impact. Upon receipt of an HB/MPI message, information shall be transferred as indicated in TABLE 2.

3.2.1.4.3.2.3 LASER. Each time the GLLD rangefinder trigger is activated the \$88 bit word in Figure 7 is passed through the GLLD interface to the DMD laser interface (3.2.1.14). The information shall be demodulated (3.2.2.3), stored and transferred in accordance with 3.2.1.4.3.2. If the consultant accordance with 3.2.1.4.3.2. If the consultant

3.2.1.4.4 Required Information. Until the operator has entered all information designated in Appendix 2 as required, as well as the Destination Address, the DND shall prevent transmission of the message. When the operator attempts to transmit a message without all required entries, the DND shall automatically sequence to the operational state where it is prepared for entry of the first element of missing required data, and indicate to the operator the entry that is required.

3.2.1.4.5 Review and Editing. Upon indication by the operator that message review is desired, the DND shall display the composed message (3.2.1.2).

The DND shall prompt the operator through editing of any field in the message.

- 3.2.1.4.6 <u>Composition Time</u>. The DMD shall allow an unskilled operator to enter any message in less than 60 seconds. The DMD shall allow an unskilled operator to enter the REQUIRED data (Appendix 2) in a FIRE REQUEST MESSAGE (Appendix 1) in less than 20 seconds.
- 3.2.1.4.7 <u>Correction</u>. The DMD shall enable the operator to select and change any desired character. Changes to characters which already have been entered shall be accomplished by an overwrite procedure, without a separate erase action.
- 3.2.1.5 <u>Message Transmission and Reception</u>. The DMD shall provide all timing and control to include radio keying (3.1.4) necessary to transmit and receive a message in the format shown in Figure 3.

3.2.1.5.1 Composed Message Retention. The DMD shall retain in memory two composed messages and associate each composed message with the fire mission sequence which was active when the message was composed (3.2.1.4.3.2.1). Each composed message shall be retained in memory until composition of a new message has begun in the fire mission sequence with which the composed message is associated.

3.2.1.5.2 <u>Preamble</u>. The transmitted preamble shall be variable from 0.2 to 4 seconds (± .1 second) in '0.2 second increments, under operator control. The DED shall accept incoming messages with any preamble equal to or greater than 0.1 seconds.

3.2.1.5.3 Synchronization. A four character synchronizing (sync) word shall immediately follow the keying block. The sync word shall consist of four 8 bit ASCII characters, 7 bits from Table 1 and 1 bit for odd parity. The first three characters shall be "SYN" (TAHLE 1) characters. The fourth shall be a "SI" (TABLE 1) character. The sync characters shall not be subject to block formatting, (3.2.1.5.8), TDC (3.2.1.5.9) or EDC (3.2.1.5.7). 3.2.1.5.4 Transmission Number. Position number two of the message header shall be used to indicate whether or not the message is a retransmission. Display of a zero shall indicate to the DiD operator that the composed message has not been transmitted. After the message is transmitted, the DMD shall automatically display a 1 in that position. With each subsequent transmission the DID shall automatically increment this position by 1. (Maximum value of this position shall be three). Transmission number transmitted shall be that which was displayed when the transmit control was activated. A third retransmission, or any change in the destination, origin, or the body of the message shall cause the transmission number to return to zero. A change of authentication code shall not affect the transmission number.

Although the transmission number is automatically sequenced, the operator shall be able to alter the transmission number (3.2.1.4.7).

3.2.1.5.5 End of Transmission (EOT) The EOT code shall be automatically inserted at the end of composed messages and ACK/NAK messages upon or before activation of the "Message Transmit" control. Each composed message shall be three 16-character blocks and each ACK/NAK message shall be one 16-character block. The last 4 characters in either a composed message or ACK/NAK message shall be 4 EOT characters. ASC II space characters shall be added as required to fill in all remaining unused spaces in a composed message. EOT characters shall be used to fill in all unused characters in an ACK/NAK message.

3.2.1.5.6 <u>Transmission/Reception Correction</u> The DMD shall provide: Error Detection and Correction, Single and Double Block Transmission, and Time Dispersed Coding of Messages. The DMD shall allow selection of a single or double block mode and a transmission/reception rate of 600 or 1200 bits per second.

3.2.1.5.7 <u>Error Detection and Correction (EDC)</u> For purposes of transmission and reception, characters shall be subjected to hamming coding to produce a 12-bit character. Each seven-bit character shall have five odd parity bits formed as follows:

Pl is odd parity on the 7 data bits.

P2 is odd parity on bits 1, 3, 5, 7.

P3 is odd parity on bits 2, 3, 6, 7

Ph is odd parity on bits 4, 5, 6, 7

P5 is odd parity on the 7 data bits and F1-P4.

The character produced is $b_1b_2b_3b_4b_5b_6b_7P_1P_2P_3P_4P_5$, where the b_1-b_7 are the ASCII code designators as shown in Table 1. Double bit errors in all messages shall be detected and indicated to the operator. Single bit errors shall be corrected. A diamond symbol shall be displayed in the received message to indicate where a double bit error has occurred.

3.2.1.5.8 Single and Double Mock Transmission/Reception. Sixteen 12-bit characters shall constitute a block. Transmission/reception of all information in the messages other than the Preamble and Sync shall be on a block basis. In the double block mode, each block of data shall be transmitted twice, as shown in Figure 5. In receiving double block transmissions, the DID shall examine the first block of the two block pair. If the first block is correct or correctable, the second block shall be ignored. If the first block is not correctable, the second block shall be used. If both blocks are in error, it shall be indicated to the operator (3.2.1.5.7). It is desired that the DID be able to compare the two blocks position by position to allow retrieval of all characters which are not uncorrectable in both blocks.

3.2.1.5.9 Time Dispersed Coding (TDC). The block of 16 twelve bit characters shall be transmitted in the following sequence: Bit 1 (ASCII b₁) of characters 1 through 16, Bit 2 of all characters, Bit 3 of all characters, and so forth until Dit 12 (15) of all characters is transmitted, as shown in Figure 6. Incoming messages shall be subjected to the inverse process which restores the original bit sequence. 3.2.1.6 Message Receipt. The DMD shall receive messages as specified in Appendix 1. Received messages shall be placed in internal storage, and a received message indicator shall be displayed to the operator. 3.2.1.6.1 Queue. The DID shall store two received messages in a first-in first-out queue. The queue shall not include a message being displayed. 3.2.1.6.1.1 Viewing. The DMD shall display the next message in the queue when the operator activates a control to bring the message out of storage. It is desired that the entire message with message type and all format field descriptors be displayed at one time. Sequential display of format field descriptors and field categories under operator control is allowed. 3.2.1.6.1.2 Storage Location. Once a message is brought out of storage to be displayed, a storage location in the received message queue shall be made available for a new incoming message. 3.2.1.6.1.3 Protection. If the DID is storing two received messages

(not including the one being displayed) no further messages shall be

received by the D.D.

- 3.2.1.6.1.4 <u>Mon-Retention</u>. Once a received message is called up by the operator for display it shall not be restored except for the provisions of 3.2.1.2.3.
- 3.2.1.6.1.5 <u>Indicators</u>. The DID received message indicators shall conform with 3.2.1.9.
- 3.2.1.7 Acknowledgements and Non-Acknowledgements.
- 3.2.1.7.1 Transmit. The DMD shall transmit an automatic ACK for received messages as illustrated in Table 4, except that an automatic ACK shall not be transmitted if the message contains uncorrectable errors. The transmission of the Auto ACK shall take place at 300 msec ±50 msec after receipt of the last character sent with a message without uncorrectable errors.
- 3.2.1.7.2 Receive. The DND shall receive, store and display one acknowledgement or non-acknowledgement as illustrated in Table 3. A received ACK or MAK shall be stored until cleared by operator action. The DND shall allow a newly received ACK or MAK to overwrite one already in storage.

3.2.1.8 Storage.

- 3.2.1.8.1 <u>Separate</u>. The DHD shall have segments of storage which are separated logically, each of which is used only for storage of the information described here and illustrated in Figure 1.
 - a. Formats and Fixed Defaults (3.1.2, 3.2.1.4.3.1)
 - b. Composition (3.2.1.4)
 - c. Dynamic Defaults (3.2.1.4.3.2)
 - d. Received Message Queue (3.2.1.6.1)
 - e. Acknowledgements and Non-Acknowledgements (3.2.1.7)
- 3.2.1.8.2 Stability. Contents of storage locations identified in 3.2.1.8.1 shall be altered only under the conditions specified in the paragraphs listed in 3.2.1.8.1.

- 3.2.1.8.2.1 Loss of Power. During loss of power, all storage and initialization values (3.2.1.3) shall be saved for at least two minutes.
- 3.2.1.8.3 <u>Transfer.</u> Information shall be transferred to and from the locations identified in 3.2.1.8.1 as specified in Table 2.
- 3.2.1.9 Operator Signals.
- 3.2.1.9.1 <u>Visual</u>. The DMD shall have visual signals for received messages, acknow-ledgement and non-acknowledgement. Legibility shall conform with 3.2.1.11.
- 3.2.1.9.1.1 Received Message. The DMD shall have two received message indications, one indication for each position in the received message queue (3.2.1.6.1). The received message indicators shall not be blocked by anylid or operational carrying configuration. Each received message indication shall be lit when a received message is stored in the corresponding position in the received message queue, and shall be extinguished when there is no message being stored in its corresponding position in the received message queue. Each received message indication shall indicate whether the received message stored in its corresponding position in the received message queue is or is not an FO Command Message (FORMAT 21, Appendix 1). The received message indication lamps shall remain lit when the display brightness control (3.2.1.2.4) is turned fully counter-clockwise.
- 3.2.1.9.1.2 Acknowledgement Indicator. The DMD shall have an indication for received acknowledgements (3.2.1.7). The indication shall light when an acknowledgement is received, and shall be extinguished in the following manner.
- a. Operator activiation of received Ack display. If Ack is displayed automatically, visual indicator shall not be extinguished at that time.

- b. Operator activiation of or control which does not affect display.
- 3.2.1.9.1.3 <u>Non-Acknowledgement Indicator</u>. The DMD shall have an indication for received non-Acknowledgements (3.2.1.7). The indication shall light when a non-Acknowledgement is received, and shall be extinguishable by operator action.
- a. Operator activiation of received NAK display. If NAK is displayed automatically, visual indicator shall not be extinguished at that time.
 - b. Operator activiation of control which does not affect display.
- 3.2.1.9.2 <u>Audible.</u> The DMD shall have audible signals which are independently adjustable incrementally in seven (7) steps from full-off to full-on. At full-on, the sound level of the signal two feetfrom the DMD shall be at least 80 dB, and in accordance with para. 5.3.3.1.1 of MIL-STD 1472.
- 3.2.1.9.2.1 Message and Ack/Nak. There shall be an audible signal to indicate the receipt of a message (3.2.1.6) or an acknowledgement or non-acknowledgement (3.2.1.7). The audible signal used to indicate the receipt of an FO Command Message (Format 21, Appendix 1) shall sound different and be readily distinguishable from the signal indicating receipt of another message, acknowledgement, or non-acknowledgement, as well as from the keyboard feedback signal.
- 2. Operator activation of received message or Ack/NAK display. If Ack/NAK is displayed automatically, audible signal shall not be turned off at that time.
 - b. Operator activiation of control which does not affect display.

3.2.1.9.2.2 <u>Keyboard</u>. The DMD shall have an audible keyboard feedback signal.

3.2.1.10 Controls.

3.2.1.10.1 Hardware.

3.2.1.10.1.1 Rotary. The DMD shall have the following rotary controls which shall be continously adjustable from detent off to full brightness and shall stop at both ends of a single revolution.

a. One control (3.2.1.2.4) for the display and operator signals.

b. One control for night illumination and keyboard illumination (3.2.1.1.2).

3.2.1.10.1.2 Switch. The DMD shall have a switch (3.2.2.1) which provides for selection of either "off", "internal power", or "external power".

3.2.1.10.2 Software. It is desired that the DMD have as many functions as possible under software control.

3.2.1.10.2.1 <u>Initialization Default Values</u>. Software controls (3.2.1.3) shall be initialized to the default values in Table 5 when memory is cleared (3.2.1.15).

3.2.1.11 <u>Legibility</u>. The DMD keyboard, operator signals and display shall be legible from a distance of 24 inches in an ambient light intensity from 10³ ft candles to 10⁴ ft candles incident on the surfaces.

3.2.1.11.1 <u>Display and Keyboard</u>. The DMD display and keyboard shall be legible from all directions at an angle of at least 20⁰ from a line normal to the surface and in the center of the display and keyboard.

- 3.2.1.11.2 Operator Signals. The DMD operator signals shall be legible in all directions at an angle of at least 45° from a line normal to each operator signal.
- 3.2.1.12 Operator Tests. The DMD shall have operator controls to initiate tests of indicators and display.
- 3.2.1.12.1 Visual.
- 3.2.1.12.1.1 <u>Display</u>. Each light-emitting element of the display shall be activated, either simultaneously or sequentially, when the corresponding control is operated.
- 3.2.1.12.1.2 <u>Visual Indicators</u>. Each visual indicator shall be activated, either simultaneously or sequentially, when the corresponding control is activated (3.2.1.9.1).
- 3.2.1.12.2 Audible. Each audible signal shall be activated sequentially when the corresponding control is operated.
- 3.2.1.12.3 Operability. The DMD shall perform a complete test of the operability of all circuits and components upon activation by the operator, and shall give a clear "Go-NO GO" indication to the operator. This test

AMENDMENT 16 JULY 1975 PAGE 4 OF 47 may be integrated with the BITE (3.2.5.2.2), but shall not require more than a single operator action to complete the test.

- 3.2.1.13 <u>Charation "Without Competer Caps.</u> The PID shall be fully operable without the presence of any connector caps, dust covers, or shorting caps.
- 3.2.1.14 Laser Interface. The DMD shall have a laser interface. Forty-eight bits of coded information-which includes direction, slant distance and vertical angle-shall be received by the DMD each time the laser is triggered. The DMD shall demodulate (3.2.2.3) and decode the laser information and store it in accordance with 3.2.1.4.3.2.3. Upon receipt of an FO COMMAND message (FORMAT 21, Appendix 1) with DESIGNATE coded in character position 8, the DMD shall send the Designate Command pulse to the GLLD in accordance with Figure 7.
- 3.2.1.15 Memory Clear. The DID shall clear memory within two seconds on activation by the operator. If software control is employed, the total time to display the control, operate it, and have memory cleared is included in the two second limit. The control shall be protected against accidential activation.
- 3.2.2 Electrical Characteristics.
- 3.2.2.1 Power. The DiD shall be capable of accepting power from either internal batteries or 20-32 volt DC vehicular external power, in accordance with MIL-STD-1275. A switch shall be provided for selection of either "off", "internal power", or "external power", If the DiD has a cover, it shall include a power interlock to turn off power to only the display whenever the cover is closed. It shall be possible to charge an internal battery when rechargeable batteries are installed while the DiD is operating on external power. The DiD shall operate from external power without the presence of an internal battery. The DMD shall have a small internal running time meter, with no moving parts. It shall be connected to register time whenever the DMD is turned on.

AMENDMENT 16 JULY 1975 PAGE 5 OF 47 3.2.2.1.1 Converter. Any converter necessary to allow the DMD to operate from external power, to include any required filtering may be built into the DMD power cable (3.1.4.1.1).

3.2.2.1.2 Batteries. The DMD shall operate from internal primary and/or secondary batteries. These batteries should be standard military batteries. They shall be available in the military inventory or off the shelf from commercial sources. They shall be operator replaceable within 2 minutes without tools. They shall be capable of operating within the environmental conditions specified in 3.2.6, with the exception that batteries may be removed and used externally at temperatures below O°F. If external batteries are to be used, the specific temperature below which those external batteries are required to meet battery life requirements shall be identified.

3.2.2.1.2.1 Level Indicator. The DMD shall provide a battery level indicator which gives an easily identifiable and reliable indication of the remaining capacity of the battery. If remaining battery capacity is below the level required for the proper operation of the DMD, the indicator shall indicate that replacement is required.

3.2.2.1.3 Battery Utilization. Batteries within the DMD shall enable it to compose, review, edit and transmit, or receive and display at least a total of 72 messages in a 24-hour period at an ambient temperature from OF to 1600F without battery replacement. The ratio of transmitted to received messages shall be 2:1; i.e., of 72 messages, 48 shall be composed and transmitted and 24 received.

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.Half of the ressages so handled shall be in darkness without other lighting while the other half shall be in 2000 foot candle ambient illumination. It is desired that 200 messages be transmitted and 100 messages received in 24 hrs. without battery replacement. For battery life computation and testing combined compose, review, edit, and transmit time shall be 120 seconds. Overall viewing time for received messages will be 30 seconds for display of the entire message at once. The DMD shall be in a mode capable of receiving a message for the entire 24 hour period.

3.2.2.2 Electrical Interface. The format for message transmission and reception shall be as shown in Figure 3. Characters (prior to EDC) shall be in ASCII code. The EDC, TDC and Block Transmission shall be performed automatically once the operator has initiated transmission.

Messages shall be transmitted and received scriptly at selectable data rate of 600 or 1200 bits per second + 0.1%. The DMD shall convert data to and from continous phase frequency shift keying (FSK) signals.

- a.. Logical ONES: 1200 Hertz + 0.1%
- b. Logical ZEROES: 2400 Hertz + 0.1%

3.2.2.2.1 Output. Those signals supplied to an associated communications device shall have the following characteristics:

a. Padio/Security equipment: 5.0 millivolts + logens into 150 Ohms (FOR FM)

millivolts + logens into 60 Ohms (FOR AM)

Pin J signal

Fin H ground

b. Wire: 0 + 1 dkm into 600 Ohms

- 3.2.2.2 Input. The input levels shall be between the following levels and shall include the end points: 40 dBm to 0 dBm.

 The DC resistance accross the wire input shall be look Ohms or greater.

 3.2.2.3 Laser Interface. The DMD shall receive a 48 bit word in the format shown in figure 7, using pulse width modulation (PWM).

 The DMD input levels from the laser shall be as shown in figure 7.

 3.2.3 Physical Characteristics.
- 3.2.3.1 Size. Height, width, and depth shall be less than 12" with cover, if any, closed. The product of the reminum length times the maximum width times the maximum depth shall be less than 300 bubic inches.
- 3.2.3.2 Weight. The DMD shall weigh less than 10 lbs. with cover, if any. This includes battery weight, but not associated cables.
- 3.2.3.3 <u>Battery Compartment</u>. The DMD shall contain a separate internal battery compartment which is sealed from electronic components to insure against damage from battery leakage. The battery compartment shall have an exhaust pressure valve to release automatically any buildup of gas within the compartment which exceeds the outside pressure by over psi. A means to equalize manually compartment pressure with outside pressure shall be provided. The battery compartment shall meet Requirement 27 of MIL-STD-454.
- 3.2.3.4 Strain Relief. The DMD shall have mechanical strain relief for the wire-line connection.
- 3.2.3.5 Mounting. The DMD shall have connections which allow it to be strapped easily to a backpack or strapped in conjunction with the AN/PRC-77 or AN/PRC-25, at the option of the operator. Mounting shall allow operation.

- 3.2.4 Reliability. The DMD shall have a specified mean-netivationsbetween-failure of 21,000 activations when tested in accordance with paragraph 4.2.
- 3.2.5 Mnintainability. The equipment shall be designed to facilitate / maintenance actions. AMCP-706-134 shall be used as the maintainability design guide for the DMD.
- 3.2.5.1 Operator-Organizational Level Maintenance. Operator Maintenance shall be limited to inspection, time compliant replacement of batteries, normal servicing, and cleaning. Failed D'Ds shall be replaced and removed for corrective maintenance.
- 3.2.5.1.1 Adjustments. Electronic design shall be such that no maintenance adjustments are required during the normal operation of the equipment.
- 3.2.5.1.2 Direct Level Maintenance, Scheduled maintenance requiring taking the equipment off-line shall not exceed 15 minutes in 24 hours.
- 3.2.5.2 Direct Level Maintenance.
- 3.2.5.2.1 Mean-Time-To-Repair. The mean-time-to-repair (MITR) shall be less than 20 minutes. Faintenance shall consist of fault detection, isolation and replacement of the Least Replaceable Unit (LRU)(a circuit. card or equivalent sub-assembly).
- 3.2.5.2.2 Built-In-Test-Equipment (BITE). The DMD shall contain built-in diagnostic and indicator circuitry for fault detection and isolation down to the LRU. This requirement shall be implemented in the DMD by provision of external test controls and indicators readily accessible to and readable by the user personnel. No external maintenance equipment shall be

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- 3.2.5.2.3 <u>IRU Adjustment</u>. The equipment shall be designed so that no maintenance adjustments are required after installation of a serviceable LRU as a replacement for a failed LRU.
- 3.2.5.2.4 <u>Higher Level Maintenance</u>. For repairs which cannot be accomplished at the direct level maintenance, LRU's will be evacuated to higher level.
- 3.2.5.3 <u>Service and Access</u>. Structural members of the equipment or chassis shall not provent access to components that require servicing.
- 3.2.5.4 Tools. Maintenance of the DMD shall be accomplished using existing standard Army tools to the maximum extent possible. Special tools, if required and approved by the procuring agency, shall be designed to withstand the intended use throughout the life of the equipment. All tools required for maintenance action shall be listed and identified. No tools shall be required to extract cards.
- 3.2.5.5 <u>Test Provisions</u>. Test provisions shall be to full extent of MIL-STD-415D. This includes Class A, B, C, and D test provisions and automatic checkout, built in test, and test point requirements as defined in MIL-STD-415D.

3.2.6 Environmental Conditions.

The DMD, including its integral battery, shall withstand the following environmental conditions and combinations of field service conditions thereof without degradation of performance specified in paragraph 3 and its subparagraphs, and paragraphs cited below. The DMD shall be constructed so that no part shall be loosened, cracked, flaked, pitted, or blistered during or as a result of an environmental test specified in paragraph 4.2.

3.2.6.1 Temperature.

3.2.6.1.1 High Temperature. The DMD shall operate at external ambient operating temperatures as high as 71°C (160°F). The DMD shall be operated by its internal battery without any degradation in specified performance and in accordance with paragraph 3.2.2.1.3, at temperatures as high as 63°C (145°F). The equipment shall perform without any degradation when tested in accordance with paragraph 4.2. The DMD shall withstand prolonged storage at temperatures of up to 68°C (155°F) without any deteriorative effects on the equipment's capability to function over the specified range of operating temperatures.

3.2.6.1.2 Low Temperature. The DMD shall operate at ambient temperatures as low as -40°C (-40°F). This operation does not require internal battery utilization; internal battery utilization in conjunction with the operation of the DMD is required at temperatures as low as 0°F. The DMD shall operate from external battery between the lower temperature limit of internal battery operation (3.2.2.1.2) and -40°C in accordance with 3.2.2.1.3. The DMD shall withstand prolonged storage at temperatures as low as -62°C (-80°F) without any deteriorative effects on the equipment's capability to function over the specified range of operating temperatures.

- 3.2.6.2 <u>Humidity.</u> The DMD shall operate and shall exhibit no physical damage, such as corrosion, rust, blistering, smalling or deterioration of parts and materials, when tested in accordance with paragraph 4.2.
- 3.2.6.3 <u>Dust.</u> The DMD shall exhibit no evidence of dust accumulation within enclosed portions of the equipment, damage or inoperation due to dust when tested in accordance with paragraph 4.2.
- 3.2.6.4 Rain. The DMD shall exhibit no evidence of water penetration when tested in accordance with paragraph 4.2.
- 3.2.6.5 Altitude. The DMD shall be subjected to the altitude of 50,000 ft. (above sea level), nonoperating, and 10,000 ft. (above sea level), operating, when tested in accordance with paragraph 4.2.
- 3.2.6.6 <u>Vibration</u>. The DMD shall withstand vibration induced during field transport by military ground vehicles, rotary and fixed wing aircraft, and watercraft. The DMD shall exhibit no mechanical damage when tested in accordance with paragraph 4.2.
- 3.2.6.7 Bounce, Loose Cargo. The DMD shall withstand bouncing induced during field transport. The DMD shall show no evidence of breakage or loosening of parts or damage to its case when tested in accordance with paragraph 4.2.
- 3.2.6.8 Shock, Transit Drop. The DMD shall withstand shock induced by field loading or unloading. The DMD shall show no evidence of breakage or loosening of parts or damage to its case when tested in accordance with paragraph 4.2.

3.2.6.9 Shock, Bench Handling. The DMD shall withstand the shocks encountered during servicing. The DMD shall exhibit no damage when tested in accordance with paragraph 4.2.

3.2.6.10 Salt Fog. The DMD shall be resistant to the corrosive effects of salt-sea atmosphere. After the salt fog test of paragraph 4.2., the DMD, when examined visually with the aid of a 10-power magnifier, shall show no evidence of degradation, such as flaking, pitting, blistering or loosening of finish or metal surface. There shall be no clogging or binding of controls or other moving parts following the test of paragraph 4.2.

3.2.6.11 Fungus. The equipment, in the assembled and ready for delivery condition, shall provide no nutrients in material coating or contaminate form, to support fungal growth when tested in accordance with paragraph 4.2. Only inherently fungus resistant grades of materials per Requirement 4, MTL-STD-454 shall be used. Prior to delivery, all fungus nutrient contaminants or residues shall be removed. After the fungus test of 4.2, the equipment shall be visually examined, using a 10-power magnifier. The equipment shall show no more than six minute unrelated spots, each no greater than 0.15 square inch in area, of sparse microbial growth (see 6.2) as evidenced by growth colonization (see 6.2) (which includes branching (see 6.2) and sporulation (see 6.2) on or within each cubic foot, or fraction thereof, of equipment assembly volume. Isolated instances of partial tubular germination (see 6.2) shall not be included in this evaluation.

3.2.6.12 Explosive Atmosphere. The DMD shall not ignite the explosive atmosphere, when tested in accordance with paragraph 4.2.

- 3.2.6.13 Immersion. The DMD shall be immersion proof to a covering depth of 3 feet of water for a period of not less than 2 hours. The DMD shall exhibit no evidence of water leakage when tested in accordance with paragraph 4.2.
- 3.2.6.14 Orientation. The DMD shall operate in orientations up to a 900 rotation about any axis from the normal operating configurations when tested in accordance with paragraph 4.2.
- 3.2.6.15 <u>Icing</u>. The DMD shall withstand surface deposits of ice in the form of glaze, rime, and hoarfrost continually for a twenty-four hour period without damage to the equipment.
- 3.2.6.16 Snow. The DMD shall operate under the conditions of blowing snow with crystal size ranging from 0.02 to 0.9 mm diameter (with median of 0.5 mm for temperatures above 14°F and median of 0.1 mm for temperatures below +14°F) blown with wind speeds of up to 10 knots.
- 3.2.6.17 Temperature Shock. The DAD shall operate following the test performed in accordance with paragraph 4.2.
- 3.2.6.18 Sunshine. The DMD shall operate when tested in accordance with requirements of paragraph 4.2.
- 3.2.6.19 Chemical, Biological, (CB). The DMD shall sustain no permanent damage or performance degradation after exposure to the following condition:

Chemical and Biological Agents. Agents as described by FM3-10 and classified supplement FM3-10B.

3.2.6.19.1 Decontamination. The DMD equipment shall be fully operationable after the following decontamination procedures:

Chemical and Biological Agents. In accordance with the provisions specified by TM 3-220.

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- 3.2.7 Useful life. The expected usoful life of the DID shall be 10 years.
- 3.3. Design and Construction
- 3.3.1 Parts, materials and processes. Electronic components, parts, devices, materials, techniques and technologies, including micro-electronics, shall conform to NII-P-11268.
- 3.3.1.1 Solid state components. Maximum use shall be made of LSI/MOS techniques to reduce size, weight and power consumption of the equipment.
- 3.3.1.2 Finish. The equipment shall be finished in accordance with MIL-F-14072. The final paint film on type 1 surfaces shall be semigloss enamel, Color Nr. 724087 of FED-STD-595.
- 3.3.1.3 <u>Switches</u>. Quietness of operation shall be a prime consideration in the selection of switches.
- 3.3.1.4 Receptacle caps. Receptacle caps shall be provided. Quietness in use shall be a prime factor in the selection.
- 3.3.1.5 <u>Fastener hardware</u>. The selection of fastener shall be in accordance with Requirement 12, Fastener Hardware of MIL-STD-454.
- 3.3.1.6 Corrosion of metal parts. Dissimilar metals shall be selected to minimize corrosion behavior factors in accordance with Requirement 16, Dissimilar Metals, of MIL-STD-454.
- 3.3.2 Electromagnetic Compatibility. There shall not be any malfunction or undesired response of the DMD components or the GFE equipment to be interfaced with the DMD due to electromagnetic interference generated, induced, or emitted by the subject equipments.

AMENDMENT 16 JULY 1975 PAGE 7 OF 47 3.3.2.1 <u>Electromagnetic Interference</u>. The DMD, associated cables, and power adapters, shall be designed for compliance with the following emission and susceptibility requirements of MIL-STD-461A, Notice 4:

CEOl	CSOl	REO2	RS03
CE03	CS02	RE02.1	RS03.1
CEO7	cs06		
CEO5			

- 3.3.2.2 Bonds and grounds. Surface preparation for bonds, grounds, EMI gaskets and panel mounted components shall be accomplished by removing all anodic film, grease, paint, lacquer or other high resistance properties from the immediate areas of contact. The DC resistance of bonds and grounds shall not exceed 2.5 milliohms. On completion of the bonding assembly or installation of panel mounted components and ascertainment of the required bonding impedance, the equipment finish shall be restored to its original condition in accordance with MIL-F-14072.
- 3.3.2.3 <u>Cables and Cornectors</u>. Coardal cables as required shall be of the double shielded type. Other interconnecting cables requiring an overall shield shall have a minimum of ninety per cent (90%) coverage. The shield shall be constructed of braided tinned copper wire. All shielded cables shall be terminated in approved military connectors provided with an EMI back shell for bonding of the cable shield. The use of the shielded cables shall be kept to a minimum by the use of alternative suppression techniques such as connector pin filters. Panel mounted connectors shall be bonded to the mounting panel in accordance with 3.3.2.2.

- 3.3.2.4 Tempest. The DMD shall meet the TEMPEST requirements of EL-SS-2604-TF.
- 3.3.3 Marking. Marking shall conform to MIL-M-13231. Wherever practicable, parts, sub-assemblies and assemblies shall be so mounted that their identification markings will be readily visible with minimum disassembly of the unit.
- 3.3.4 Workmanship. The minimum acceptable standards of workmanship for the equipment shall be in accordance with Requirement 9, MIL-STD-454 and applicable portions of MIL-F-11268, MIL-STD-252, and MIL-E-4158D.
- 3.3.5 <u>Interchangeability</u>. Interchangeability shall be in accordance with MIL-STD-454, Requirement 7, Interchangeability.
- 3.3.6 <u>Safety</u>. Design criteria shall be in accordance with MIL-STD-454, Requirement 1; and MIL-STD-1472, paragraph 5.13 and shall include but not limited to the following:
- 3.3.6.1 Personnel Safety. The system shall minimize the possibility of injury to operational, installation, and maintenance personnel.
- 3.3.6.1.1 Mechanical Safety. Provisions shall include paragraph 8, MTL-STD-454. Requirement 1 and the following:
- a. Finished item(s) shall bear no raw, sharp, rough metal edges, or sharp corners or protrusions on the DMD.
- b. Adequate lifting and carrying provisions (MIL-STD-1472, paragraph 5.9.
 11.3).
- c. Adequate safeguards to prevent inadvertent entrapment of body parts and clothing.
- 3.3.6.1.2 Electrical Safety. Provisions shall include paragraph 5 of MIL-STD-454, Requirement 1.

- 3.3.6.2 Equipment Safety. The system shall minimize the possibility of equipment damage, degradation of efficiency or mission failure due to the following conditions:
 - a. Operator induced errors.
 - b. Improper cabling.
 - c. Power failure or electrical overstress on components.
 - d. Secondary failures.
- e. Installation, storage, operation handling, maintenance and transportation.
 - f. Overload protection, Requirement 8, MIL-STD-454.
- g. Contacts used on chassis, panels or cable entrance connectors shall be recessed to prevent breakage or damage. Socket connectors shall be used on electrically hot contacts such as power sources.
- 3.3.6.3 Environmental Safety.
- 3.3.6.3.1 <u>Hazardous Environments.</u> The equipment shall preclude ignition or explosion when operated in a Class I (gases or vapors) or Class II (combustible dusts) hazardous atmospheres of National Electric Codes (NFPA 70-1971).
- 3.3.6.3.2 Radioactive Materials. Radioactive materials shall be per the following:
- a. Usage shall abide by Atomic Energy Commission regulations and shall require approval of the procuring activity. Radium shall not be used to achieve self-luminosity.
- b. Marking or labeling of commodities containing intentionally added radioactive materials shall conform to MIL-M-19590. Packages and containers shall be marked in accordance with MIL-STD-129 and DOT regulations.

- 3.3.7 <u>Human Engineering</u>. Human engineering shall be conducted in accordance with MIL-H-46855, and shall include identification and analysis of impacts on human engineering factors associated with any design changes to the equipment. The specific design of the equipment shall be guided by the human engineering criteria and principles cited in MIL-STD-1472. These criteria shall be applied to the equipment design to assure that optimum performance of man-machine system, consistent with other requirements is realized. Maximum effort shall be directed toward reduction of human operational error. In particular, the design criteria cited in MIL-STD-1472 relating to visual and auditory displays, controls, labeling, mantransportability, maintainability and safety, shall be utilized except for conflicts with specific provisions of this specification. In addition, the design shall conform to the following:
- 3.3.7.1 Mnemonics. The operator shall not have to remember mnemonics of codes for the purpose of composing or reading messages.
- 3.3.7.2 <u>Display Fields</u>. Fields of data display shall be separated distinctly by spacing, heavy lines, shading or other system. All portions of the display shall be visible under the lighting conditions specified in 3.2.1.1.2. Luminance (brightness) of display shall be compatible with the expected ambient illuminance level, and shall be 10% greater than the surrounding luminance.
- 3.3.7.3 Entering Data. The means of entering data shall not require a high

degree of dexterity. The operator's hand shall not need to move from one area to another during message composition. Operation shall be equally easy for right or left-handed operators.

3.3.7.4 Numbers. Numbers entered shall be complete. For example,
470 meters shall be entered as 0470 rather than as 470 when entered in a
four digit field. (Used 5 test has when to go to meet field)
3.3.7.5 Configuration. Accessibility and configuration shall be such

that the equipment can easily be operated and maintained by US Army personnel whose body dimensions fall within the 5th and 95th percentiles as defined in MIL-STD-1472.

- 3.3.7.6 <u>Labeling</u>. Equipment labeling shall conform to the requirements of MIL-SID-1472.
- 3.3.7.7 Malfunction. Equipment malfunction detection and equipment removal replacement and repair capability shall conform to the requirements of MIL-STD-1472. Controls and indicators for operation or maintenance functions shall conform to the requirements of MIL-STD-1472.
- 3.4 <u>Documentation</u>. Documentation requirements for the DMD are specified in the contract.
- 3.5 <u>Logistics</u>. Logistic requirements, such as spare parts list, provisioning, tools and test equipment, etc. shall be provided as specified in the contract and as specified in 3.4.
- 3.6 Training. Personnel training requirements shall be as specified in the contract.

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4. QUALITY ASSURANCE PROVISIONS

4.1 General.

This section contains the requirements for verification of Configuration Item (CI) performance. The CI shall conform to all the requirements of this specification. Formal qualification acceptance criteria (Section 3) is applicable to all DMD models.

4.1.1 Responsibility for Verification

Unless otherwise specified in the contract or purchase order, the supplier shall be responsible for the performance of all verification requirements, Section 3.0, as specified herein. Except as otherwise specified, the supplier will utilize his own facilities or any other facility acceptable to the Government. Government personnel shall witness Formal Qualification Tests and verify total compliance of requirements specified herein. The Government reserves the right to perform any of the verifications set forth in the specifications, where such verifications are deemed necessary to ensure that supplies and services conform to prescribed requirements. The Government reserves the right to attend and observe any verifications at the contractors location of performance of the verification or of any lower tier supplier. The Verification methods are Inspection, Analysis, Demonstration, and Test.

4.1.2 Classification of Verification

Verifications shall be classified as follows:

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- a. Engineering test and evaluation
- b. Preliminary qualification
- c. Formal qualification
- 4.1.2.1 Engineering Test and Evaluation. The supplier shall conduct those tests and evaluations which are an essential part of the development process of software, breadboard/brassboard, subassemblies up to CI level in order to assure that critical items of the design satisfy the detailed requirements. The data acquired may be used in certain instances to augment or satisfy some of the quality conformance verifications of 4.2 that require analysis for verification.
- 4.1 2.2 <u>Preliminary Qualification</u>. Unless otherwise specified by the contract, or order, preliminary qualification verification is oriented toward verifying proper performance of the assemblied CI prior to formal qualifications. These verifications shall be conducted in accordance with a Government approved test plan and procedure.
- 4.1.2.3 Formal Qualification. The supplier shall conduct formal qualification verifications in accordance with the provisions specified herein. These verifications shall demonstrate compliance with all of the characteristics stipulated in this specification, and shall be conducted in accordance with a Government approved test plan and procedure. The Government plans to witness these verifications formally. Starting with the first equipment to be subjected to FQT and ending with the completion of FQT and final acceptance of the equipment by the Government, operation time of each CI under test shall be recorded along with the failures and time between failures over the entire battery of tests.

4.1.3 Test Conditions

Unless otherwise specified, verifications shall be performed under the following conditions.

- 4.1.3.1 Atmospheric Conditions. Except for those tests of the CI which are to be performed under the environmental extremes specified herein, all tests shall be performed at an atmospheric pressure within the range of 24 to 31 inches of mercury, a temperature of between +16 degrees and +32 degrees C (+60 degrees and +90 degrees F) and a relative humidity of not more than 80 percent. Actual atmospheric conditions shall be recorded during all tests and included in reports of test results.
- 4.1.3.2 <u>Tolerances of Test Conditions</u>. Unless otherwise specified, the maximum allowable tolerances of test conditions shall be as specified in the appropriate test documentation referenced herein.
- 4.1.3.3 Accuracy of Test Equipment. The accuracy of instruments and test equipment used to control or monitor the test parameters shall be such that all tests can be performed with an accuracy of at least two times better than the tolerance of the variable to be measured.
- 4.1.3.4 <u>Input Power</u>. Input power provided during operational tests shall be **20VDC** to 32VDC meeting the requirements under all environmental conditions.
- 4.1.3.5 Adjustments During Tests. Changes to the CI shall not be permitted during qualification tests. Adjustments during tests shall be considered as failures.

4.1.3.6 <u>Disassembly after Tests</u>. Where considered necessary components of the CI shall be disassembled after qualification testing is completed and inspected to determine margins of safety and potential failure modes.

4.1.3.7 Test Plans & Reports

4.1.3.7.1 Test Plans

All test plans and test procedures as described herein and the contract shall identify the procedures used to perform the tests required by 4.2.

The test plans and procedures shall be submitted for approval (in accordance with CDRL schedules) by the Contracting Officer's Representative (COR).

The test plans shall contain as a minimum, but not be limited to the following:

- a. Time schedule sequence of tests.
- b. Procedures for all tests necessary to demonstrate compliance with this specification, the referenced specifications, and their subsidiary specifications.
- c. Measurement values, together with permissible tolerances.
- d. Block diagram of test set up.
- e. Identification of test instruments.
- f. Personnel Type, Quantity & TASK Performed.
- g. Identification of Facilities, Type & Location.

4.1.3.7.2 Test Reports

The contractor shall submit a test report after completion of each specified acceptance test or groups of major tests, such as the initial Engineering Test and Evaluation, performance tests (initial(PQT)& Final (FQT)) EMI, Tempest, environmental, reliability, maintainability). The reports shall be designed to be stand-alone reports (sequential volumes) which can be combined with a Summary Report reflecting all retesting without rework of the basic stand-alone volumes.

A final report complete in detail shall cover all inspections, analysis demonstrations, tests with correlation to CI specification requirements whether conducted at the contractor's facilities or elsewhere. The reports shall contain all test procedures, test results, observations, calculations and all essential details of the testing equipment (manufacturer's model, serial number, date of calibration, etc.).

The reports shall indicate that the equipment (CI) complies with each individual electrical, mechanical, or other specification requirements. The compliance shall be expressed in the report by the use of the same terms as those used in the specification to express the requirement. If at any time after testing begins, but prior to completion of all specified tests of the CI, the CI is modified in any manner, to correct any fault; the CI shall be retested at any or all levels at the Government's option, unless a waiver is submitted and approved by the Government. The diagnosis of the fault and the corrective modifications and date shall be documented in this report.

A complete record of tests performed on the CI shall be made, including test conditions, results (operating time, failures, and time between failures of each CI), and a summarization, all which shall be provided upon submission of the CI tested. All test results shall be maintained for a period of not less than three years.

4.1.3.7.3 Rejection and Retest. Noncompliance with the requirements of any test shall be cause for rejection. Adjustments during tests shall also be cause for rejection. The cause of any failure shall be determined prior to retest. Upon evaluation of the cause of failure and correction of

the failure, the test shall be repeated in which the failure occurred.

If the Government determines that the failure has an impact on prior tests, then the prior tests must be repeated.

4.1.3.7.4 Test Sequence. The contractor shall conduct all necessary tests specified herein on the CI's within the specified time frame to ensure that all deliverable CI's are fully qualified. The suggested allocation of CI's by test shall be reviewed and addressed by the contractor.

Contractor shall submit in response to the RFP, any alternate allocations of CI's by test which will improve the overall delivery schedule and/or test schedule, and reduce the Government's cost in development of the CI's. Contractor's alternative allocation and/or test sequence shall be submitted for Government approval. The Government suggested minimum allocation of CI's by test is as follows:

- a. Performance & Functional Demonstration & Test two (2) CI's.
- b. DMD TACFIRE Systems Integration Test one (1) CI.
- c. MEE and Maintainability Demonstration one (1) CI.
- d. EMI and TEMPEST one (1) CI.
- e. Environmental Tests three (3) CI's. The test sequence on page 48 Table 7, shall be used for the limited sample size.
 - f. Reliability Test four (4) CI's.

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The remaining CI's shall undergo sufficient performance and functional tests to demonstrate compliance with all the requirements specified herein. The Contractors Test Plan of what constitutes the above remaining tests and compliance of same shall be submitted to the Government for approval.

	2	Unit 2	ture Sand & Dust sture Orientation Explosion CB (3)	Vibration Shock Fungus Pounce, Loose Cargo
BLE		Unit 1	Altitude Low Temperature High Temperature Rain Sunshine Freezing Rain Temperature Shock	Humidity Salt fog
UNITS AVAILABLE		Unit 3	Immersion (2) Sand & Dust	Vibration Shock Fungus Bounce, Loose Cergo
U	3	Unit 2	Orientation Explosion CB (3)	Salt fog
		Unit 1	Altitude Low Temperature High Temperature Rain Sunshine Freezing Rain Temperature Shock	Humidity

(1) The tests above the broken line are considered non-damaging. The order of these tests and choice of units to use may be varied if convenient. NOTE:

The immersion test shall be performed prior to and following shock testing of the same test. item. Following CB and salt fog testing, the test item shall be thoroughly washed, cleaned, dried and refurbished, if recessary, before proceeding with the subsequent tests. 33

TABLE 7

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4.2 Quality Conformance Verifications

Formal verification of the requirements presented in this specification shall be as indicated in the following paragraphs by Inspection, Analysis, Demonstration, and Test. Table 8 correlates the requirements and the method of verification.

The multiple entries per paragraph indicate more than one type of verification will be required by the contractor in the respective Test Methods time frame; to ensure the quality of the finished product, as well as, to allow for early alerting to the Government of deviation from the CI specification requirements.

This does not relieve the contractor of his responsibility for performing any additional verifications which are necessary to control the quality of the product and to assure compliance with all specification requirements.

The initial delivered CI's shall have the same physical and functional characteristics; including finish, and shall be subject to the same quality assurance control as the final units delivered. All CI's shall contain the same level of modifications. All formal tests performed with the respective CI's shall be conducted with their respective sets of deliverable cables.

The following subparagraphs specify the methods for formally verifying that all requirements set forth herein have been met. Verification shall be established by:

- a. Inspection. The contractor shall show through visual means, physical manipulation, gauging, or measurement that the requirements have been met.
- b. Analysis. The contractor shall show through review of applicable and adequate documentation that the requirements have been met.
 Verification shall be by mathematical analysis, statistical analysis (sampling), the correlation of measured data and observed test results with calculated expected values, and conformance of end items with contractor generated specifications and documentation to lower tier supplier, as well as, government approved CI specifications and documentation.
- of equipment that the requirements have been met.
- d. <u>Tests</u>. The contractor shall show through functional and electrical, mechanical, and environmental tests, including the collection and analysis of data, that the requirements have been met.

The test methods shall form the basis for the preparation of test plans and procedures as required by the contract or order.

NA - Not Applicable
I - Inspection
A - Analysis

D - Demonstration

T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	iſi	cat	ion				Te	st
Page	Paragraph	Title		Met	hod			T	у, е		Page
	a as as ap.	1	NA	I	A	D	T	1	2	3	
5	3.	REQUIREMENTS	NA								65
5	3.1	ITEM DEFINITION	NA								65
5	3.1.1	Employment				D				3	65
5	3.1.2	Formats				D			2	3	65
5	3.1.3	Operational Constraints				D			2	3	65
6	3.1.4	Interface				D				3	66
6	3.1.4.1	Cables				D				3	66
6	3.1.4.1.1	Power Cables				D				3	66
6	3.1.4.1.2	Communications Cables				D				3	66
7	3.1.4.2	Security				D				3	66
7	3.1.5	Modularity	NA								66
7	3.1.5.1	Definition				D		1	2	3	66
7	3.1.5.2	Partitioning		I							66
8	3.2	CHARACTERISTICS	NA								66
8	3.2.1	Performance				D			2	3	66
8	3.2.1.1	Keyboard				D			2	3	66
8	3.2.1.1.1	Bounce				D			2	3	67

Verification Cross-Reference Index Table 8

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(PAGES 51 & 52 NOT USED)

NA - Not Applicable

I - Inspection
A - Analysis

D - Demonstration

T - Test

Test Types:

1 - Engineering Test & Evaluation2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	iſi	cat	ion			Test		
Page	Paragraph	Title		Met	hod			T	ype		Page
1260	ran agraph	11016	NA	I	A	D	Т	1	2	3	
8	3.2.1.1.2	Lighting and Control					T		2	3	67
8	3.2.1.1.3	Pressure					T		2	3	67
8	3.2.1.2	Display					T		2	3	67
8	3.2.1.2.1	Configuration					T		2	3	67
8	3.2.1.2.2	Turn Off					Т		2	3	67
9	3.2.1.2.3	Return				D			2	3	67
9	3.2.1.2.4	Brightness Control-					Ť		2	3	67
9	3.2.1.3	Initialization					T		2	3	68
9	3.2.1.3.1	DMD Address					T			3	68
9	3.2.1.3.2	Destination Address					Т			3	68
10	3.2.1.3.3	Test/Data Designator					T			3	68
10	3.2.1.3.4	Single/Double Block Transmission					T			3	68
10	3.2.1.3.5	Transmission Rate					T			3	68
10	3.2.1.3.6	Preamble					T			3	68
10	3.2.1.3.7	Setting Advance Delay					T			3	68
10	3.2.1.3.8	Setting Audible Signals					т		2	3	69
10	3.2.1.4	Message Composition				D			2	3	69

NA - Not Applicable

I - Inspection

A - Analysis

D - Demonstration

T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Verification Method					Tes	st .		
Page	Paragraph	Title					T	уре		Page	
	Tax agrap.		NA	I	A	D	T	1	2	3	
n	3.2.1.4.1	Operator Prompting				D				3	69
n	3.2.1.4.1.1	Illegal Entries Prevented				D				3	69
n	3.2.1.4.1.2	Character Storage				D				3	69
n	3.2.1.4.1.3	Advance Delay					Т		2	3	69
n	3.2.1.4.1.4	Message Type in Summary				D				3	69
11	3.2.1.4.1.5	Character & Data Element Sequencing				D			2	3	69
12	3.2.1.4.1.6	Attitude				D				3	69
12	3.2.1.4.1.7	Shift				D				3	69
12	3.2.1.4.1.8	Target Type Not Given				D				3	70
12	3.2.1.4.2	Authentication of Messages					Т			3	70
13	3.2.1.4.3	Default Values				D			2	3	70
13	3.2.1.4.3.1	Fixed				D			2	3	70
13	3.2.1.4.3.2	Dynamic				D			2	3	70
13	3.2.1.4.3.2.	l Two Fire Missions				D			2	3	70
13	3.2.1.4.3.2.	1.1 Active Fire Mission					т		2	3	70
13	3.2.1.4.3.2.	1.2 Fire Mission Associated with Target Number				D			2	3	70
14	3.2.1.4.3.2.					D			2	3	70

NA - Not Applicable

I - Inspection

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T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	if1	cat	ion				Tes	st
Page	Paragraph	Title	Method					T	ype		Page
Tage	raragraph	11016	NA	I	A	D	т	1	2	3	
14	3.2.1.4.3.2.	3 Laser				D			2	3	70
15	3.2.1.4.4	Required Information				D			2	3	72
15	3.2.1.4.5	Review and Editing				D				3	71
15	3.2.1.4.6	Composition Time					T		2	3	71
15	3.2.1.4.7	Correction				D				3	71
15	3.2.1.5	Message Transmission & Reception				D				3	71
16	3.2.1.5.1	Composed Message -Retention				D				3	71
16	3.2.1.5.2	Preamble					T			3	71
16	3.2.1.5.3	Synchronization				D				3	71
16	3.2.1.5.4	Transmission Number				D			2	3	71
17	3.2.1.5.5	End of Transmission (EOT)				D				3	71
17	3.2.1.5.6	Transmission/Reception Correction					T			3	71
17	3.2.1.5.7	Error Detection & Correction (EDC)					T		2	3	72
18	3.2.1.5.8	Single & Double Block Transmission/Reception					T		2	3	72
19	3.2.1.5.9	Time Dispersed Coding (TDC)					T		2	3	72
19	3.2.1.6	Message Receipt				D			2	3	72
19	3.2.1.6.1	Queue				D			2	3	72

NA - Not Applicable

I - Inspection
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T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification

3 - Formal Qualification

		Requirement	Ver	iſi	cat	ion				Te	st
Page	Paragrap!	Title		Met	hod			T	λbe		Page
- 420	Taragrap.	11016	NA	I	A	D	T	1	2	3	
19	3.2.1.6.1.1	Viewing				D			2	3	72
19	3.2.1.6.1.2	Storage Location				D			2	3	72 .
19	3.2.1.6.1.3	Protection				D			2	3	72
20	3.2.1.6.1.4	Non-Retention				D			2	3	72
20	3.2.1.6.1.5	Indicators				D			2	3	73
20	3.2.1.7	Acknowledgements and Non- Acknowledgements	NA								73
20	3.2.1.7.1	Transmit					T			3	73
20	3.2.1.7.2	Receive					T			3	73
20	3.2.1.8	Storage	NA								73
20	3.2.1.8.1	Separate				D				3	73
20	3.2.1.8.2	Stability				D				3	73
21	3.2.1.8.2.1	Loss of Power				D			2	3	73
21	3.2.1.8.3	Transfer				D		1		3	73
21	3.2.1.9	Operator Signals	NA								74
21	3.2.1.9.1	Visual					T		2	3	74
21	3.2.1.9.1.1	Received Message				D			2	3	74
21	3.2.1.9.1.2	Acknowledgement Indicator				D			2	3	74

NA - Not Applicable

I - Inspection
A - Analysis

D - Demonstration T - Test

Test Types:

1 - Engineering Test & Evaluation2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	ifi	cat	ion				Tes	st
Page	Paragraph	Title	Method					T	ype		Реде
	Tanagrap.		NA	I	A	D	T	1	2	3	
22	3.2.1.9.1.3	Non-Acknowledgement Indicator				D			2	3	74
22	3.2.1.9.2	Audible					T		2	3	74
22	3.2.1.9.2.1	Message and Ack/NAK				D				3	74
23	3.2.1.9.2.2	Keyboard				D			2	3	74
23	3.2.1.10	Controls	NA								74
23	3.2.1.10.1	Hardware	NA								74
23	3.2.1.10.1.1	Rotary		I						3	74
23	3.2.1.10.1.2	Switch				D				3	75
23	3.2.1.10.2	Software				D				3	75
23	3.2.1.10.2.1	Initialization Default Values				D			5	3	75
23	3.2.1.11	Legibility					Т	1	2	3	75
23	3.2.1.11.1	Display and Keyboard					T	1	2.	3	78
24	3.2.1.11.2	Operator Signals					T	1	2	3	78
24	3.2.1.12	Operator Tests				D				3	78
24	3.2.1.12.1	Visual	NA								78
24	3.2.1.12.1.1	Display				D			1	3	78
24	3.2.1.12.1.2	Visual Indicators				D				3	79

NA - Not Applicable

I - Inspection
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Test Types:

1 - Engineering Test & Evaluation2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	iſi	cat	ion				Te	st .
Page	Paragraph	Title]	Method					уре		Page
Lage	rat agrapu	11010	NA	I	A	D	т	1	2	3	
24	3.2.1.12.2	Audible				D				3	79
24	3.2.1.12.3	Operability				D				3	79
25	3.2.1.13	Operation Without Connector Caps				D				3	_79
25	3.2.1.14	Laser Interface				D				3	79
25	3.2.1.15	Memory Clear					Т			3	79
25	3.2.2	Electrical Characteristics	AN								79
25	3.2.2.1	Power				D				3	79
26	3.2.2.1.1	Converter				D				3	79
26	3.2.2.1.2	Batteries					Т			3	79
26	3.2.2.1.2.1	Level Indicator					Т			3	80
26	3.2.2.1.3	Battery Utilization					Т		2	3	80
27	3.2.2.2	Electrical Interface					т			3	80
27	3.2.2.2.1	Output	1				T			3	80
28	3.2.2.2.2	Input					т			3	80
28	3.2.2.3	Laser Interface					Т			3	80
2 8	3.2.3	Physical Characteristics	NA								80
28	3.2.3.1	Size		I					2	3	80

NA - Not Applicable

I - Inspection A - Analysis

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Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	ifi	cat	ion					st
Page	Paragraph	Title		Met	hod			T	ype		Page
	1 ca agrapii	1	NA	I	A	D	T	1	2	3	
28	3.2.3.2	Weight		I					2	3	81
28	3.2.3.3	Battery Compartment				- 1	T	1		3	81
28	3.2.3.4	Strain Relief		I						3	81
28	3.2.3.5	Mounting	1			D				3	81
29	3.2.4	Reliability					Т			3	81
29	3.2.5	Maintainability			A					3	87
29	3.2.5.1	Operator Maintenance			A					3	87
29	3.2.5.1.1	Adjustments				D				3	87
29	3.2.5.1.2	Scheduled Maintenance				D				3	87
29	3.2.5.2	Organizational Level Maintenance	NA								87
29	3.2.5.2.1	Mean-Time-To-Repair					Т			3	87
29	3.2.5.2.2	Built-In-Test-Equipment (BITE)					T			3	88
30	3.2.5.2.3	LRU Adjustment				D				3	88
30	3.2.5.2.4	Higher Level Maintenance			A					3	88
30	3.2.5.3	Service and Access				D				3	88

NA - Not Applicable

I - Inspection
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T - Test

Test Types:

1 - Engineering Test & Evaluation2 - Preliminary Qualification3 - Formal Qualification

		Requirement	Ver	ifi	cat	ion				Tes	st
Page	Paragraph	Title		Met	hod			T	уре		Page
rage	raragraph	Ittle	NA I		A	D	т	1	2	3	
30	3.2.5.4	Tools				D				3	89
30	3.2.5.5	Test Provisions					T			3	89
31	3.2.6	Environmental Conditions					T			3	89
31	3.2.6.1	Temperature -	NA								90
31	3.2.6.1.1	High Temperature					Т			3	90
31	3.2.6.1.2	Low Temperature					т			3	91
32	3.2.6.2	Humidity					T			3	91
32	3.2.6.3	Dust					Т			3	92
32	3.2.6.4	Rain					T			3	92
32	3.2.6.5	Altitude					T			3	93
32	3.2.6.6	Vibration					T			3	93
32	3.2.6.7	Bounce, Loose Cargo					T			3	95
32	3.2.6.8	Shock, Transit Drop Shock					T			3	95
33	3.2.6.9	Shock, Bench Handling					т			3	95
33	3.2.6.10	Salt Fog					Т			3	95
33	3.2.6.11	Fungus					т			3	96
33	3.2.6.12	Explosive Atmosphere					Т			3	98

NA - Not Applicable

I - Inspection

A - Analysis

D - Demonstration

T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Chalification

3 - Formal Qualification

		Requirement	Ver	ifi	cat	ion				Tes	t	
Page	Paragraph	Title		Met	hod			T	ype		Page	
- 200	1 ca co, ap.	11010	NA					1	2	3		1
34	3.2.6.13	Immersion /					Т			3	98	1
34	3.2.6.14	Orientation					т			3	99	1
34	3.2.6.15	Icing					T			3	99	
34	3.2.6.16	Snow			A		-			3	100	
34	3.2.6.17	Temperature Shock					T			3	100	
34	3.2.6.18	Sunshine					T			3	101	1
34	3.2.6.19	Chemical, Biological (CB)					T			3	101	1
34	3.2.6.19.1	Decontamination					T			3	101	1
35	3.2.7	Useful Life			A					3	101	1
35	3.3	Design and Construction	NA								101	-
35	3.3.1	Parts, Materials and Processes			A			1			101	-
35	3.3.1.1	Solid State Components			A			1			102	-
35	3.3.1.2	Finish			Α					3	102	1
35	3.3.1.3	Switches			A					3	102	1
35	3.3.1.4	Receptacle Caps		I						3	102	1
35	3.3.1.5	Fastener Hardware			A					3	102	
35	3.3.1.6	Corrosion of Metal Parts			A					3	102	1

Verification Cross-Reference Index

Table 8

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MA - Not Applicable

I - Inspection

A - Analysis

D - Demonstration

T - Test

Test Tymes:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification

3 - Formal Qualification

Requirement			Ver	Verification				Test			
Page Paragraph		Title	Method					Туре			Page
1 000	raragrap	Title		I	A	D	т	1	2	3	
35	3.3.2	Electromagnetic Compatibility					т			3	103
36	3.3.2.1	Electromagnetic Interference					T			3	103
36	3.3.2.2	Bonds and Grounds					Т			3	103
36	3.3.2.3	Cables and Connectors					т			3	104
37	3.3.2.4	Tempest					Т			3	104
37	3•3•3	Marking		I						3	104
37	3.3.4	Workmanship		I						3	104
37	3-3-5	Interchangeability				D				3	104
37	3.3.6	Systems Safety			A					3	104
37	3.3.6.1	Personnel Safety			A					3	105
37	3.3.6.1.1	Mechanical Safety			A					3	105
37	3.3.6.1.2	Electrical Safety			A					3	105
38	3.3.6.2	Equipment Safety					т			3	105
38	3.3.6.3	Environmental Safety	NA								105
38	3.3.6.3.1	Hazardous Environments			A					3	105
38	3.3.6.3.2	Radioactive Materials			A					3	106
			1								

NA - Not Applicable

I - Inspection
A - Analysis

D - Demonstration

T - Test

Test Types:

1 - Engineering Test & Evaluation

2 - Preliminary Qualification

3 - Formal Qualification

Requirement			Verification					Test			
Page Paragray	Paragraph	mh Title	Method					Туре			Page
	Tanagrap.	Title		I	A	D	T	1	2	3	
39	3-3-7	Human Engineering				D				3	106
39	3.3.7.1	Mnemonics				D				3	106
39	3-3-7-2	Display Fields					Т		2	3	106
39	3-3-7-3	Entering Data				D			2	3	106
40	3-3-7-4	Numbers				D			2	3	106
40	3-3-7-5	Configuration				D				3	107
40	3.3.7.6	Labeling		I						3	107
40	3-3-7-7	Malfunction				D				3	107
40	3.4	Documentation		I						3	107
40	3.5	Logistics		I						3	107
40	3.6	Training		r						3	107

Verification Cross-Reference Index

Table 8

4.2 Equipment Performance Verification (Inspection (I), Analysis (A), Demonstration (D), Test (T)).

Paragraph	Verification Method	Requirements
3.	N/A	Requirements
3.1	N/A	Item Definition
3.1.1	ע	Employment - Operation of the DMD
		with the TACFIRE System shall be
		demonstrated. A TACFIRE System
		will be made available at a
		Government test site for this purpose.
		Prior to this demonstration, full
		compliance with the performance
		characteristics of 3.2. and its
		subparagraphs shall be verified.
		This demonstration shall include all
		modes of operation and shall exercise
		all messages of Appendix 1 to verify
		interfaces and operability with TACFIRE.
3.1.2	D	Formats - All message formats of
		Appendix I shall be exercised.
3.1.3	D	Operational Constraints

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Paragraph	Verification Method	Requirements
3.1.4	D	Interface
3.1.4.1	D	Cables - The Government shall
3.1.4.1	Ь	
		inspect cable sets in addition
		to Formal Demonstration of use
		of cables.
3.1.4.1.1	D	Power Cables - The Government shall
		inspect cables in addition to
		Formal Demonstration of use of cables.
3.1.4.1.2	D	Communications Cables - The
		Government shall inspect cables in
		addition to Formal Demonstrations
		of use of sets of cables.
3.1.4.2	D	Security
3.1.5	N/A	Modularity
3.1.5.1	. D	Definition
3.1.5.2	I	Partitioning
3.2	N/A	Characteristics
3.2.1	D	Performance
3.2.1.1	D	Keyboard- To insure that the 3.2.1.1
		requirements are met, the Government
		shall require a legibility and

Paragraph	Verification Method	Requirements
3.2.1.1 (continued)		mechanical test of the keyboard in the final assembled deliverable CI.
3.2.1.1.1	D	Bounce
3.2.1.1.2	T	Lighting and Control
3.2.1.1.3	T	Pressure - Assurance that the pressure
		requirements are met shall be
		determined by a mechanical test of
		the keyboard in the final assembled
		CI recording actual depression
		(Pressure to actuate) pressure of
		each key.
3.2.1.2	T	Display - Demonstration of CI shall
3.2.1.2	•	be integrated into a formal test.
		be integrated into a formal vest.
3.2.1.2.1	T	Configuration - Demonstration shall
		be integrated into a formal test.
3.2.1.2.2	T	Turn Off
3.2.1.2.3	D	Return
3.2.1.2.4	T	Brightness Control

Paragraph	Verification Method	Requirements
3.2.1.3	T	Initialization - Demonstration shall
		be integrated into a formal test.
3.2.1.3.1	T	DMD Address - Demonstration shall be integrated into a formal test.
		Description
3.2.1.3.2	T	Destination Address - Demonstration
		shall be integrated into a formal test.
3.2.1.3.3	T	Test/Data Designator - Demonstration
		shall be integrated into a formal test.
3.2.1.3.4	T	Single/Double Block Transmission -
		Demonstration shall be integrated into
		a formal test.
3.2.1.3.5	T	Transmission Rate - Demonstration
		shall be integrated into a formal test.
3.2.1.3.6	T	Preamble - Demonstration shall be
		integrated into a formal test.
3.2.1.3.7	T	Setting Advance Delay - Demonstration
		shall be integrated into a formal test.

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Paragraph	Verification Method	Requirements
3.2.1.3.8	T	Setting Audible Signals - Demonstra-
		tion shall be integrated into a
		formal test.
3.2.1.4	D	Message Composition - Each message in
		Appendix 1 shall be composed and
		entered into the DMD.
3.2.1.4.1	D	Operator Prompting
3.2.1.4.1.1	D	Illegal Entries Prevented
3.2.1.4.1.2	ם	Character Storage
3.2.1.4.1.3	T	Advance Delay
3.2.1.4.1.4	D	Message Type in Summary
3.2.1.4.1.5	D	Character and Data Element Sequencing
3.2.1.4.1.6	D	Attitude
3.2.1.4.1.0	D	Accieude
3.2.1.4.1.7	D	Shift
3.2.1.7.1.1		DILLE

Paragraph 3.2.1.4.1.8	Verification Method	Requirements Target Type Not Given
3.2.1.4.2	T	Authentication of Messages - Demonstration shall be integrated into a formal test.
3.2.1.4.3	D	Default Values
3.2.1.4.3.1	D	Fixed
3.2.1.4.3.2	ņ	Dynamic
3.2.1.4.3.2.1	D	Two Fire Missions
3.2.1.4.3.2.1.1	T	Active Fire Mission - Demonstration shall be integrated in a formal test.
3.2.1.4.3.2.1.2	D	Fire Mission Associated with Target
3.2.1.4.3.2.2	D	High Burst Mean Point of Impact
3.2.1.4.3.2.3	D	Laser

Paragraph	Verification Method	Requirements
3.2.1.4.4	D	Required Information
3.2.1.4.5	D	Review & Editing
3.2.1.4.6	T	Composition - Demonstration shall be integrated into a formal test.
3.2.1.4.7	D	Correction
3.2.1.5	D	Message Transmission & Reception
3.2.1.5.1	D	Composed Message Retention
3.2.1.5.2	T	Preamble - Demonstration shall be integrated in a formal test.
3.2.1.5.3	D	Synchronization
3.2.1.5.4	D	Transmission Number
3.2.1.5.5	D	End of Transmission (EOT)
3.2.1.5.6	T	Transmission/Reception -Correction - Demonstration shall be integrated into a formal test.

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Paragraph	Verification Method	Requirements
3.2.1.5.7	T	Error Detection and Correction (EDC) -
		Demonstration shall be integrated
		into a formal test.
3.2.1.5.8	T	Single and Double Block Transmission/ Reception
		- (mg)
3.2.1.5.9	T	Time Dispersed Coding (TDC) -
		Demonstration shall be integrated
		into a formal test.
3.2.1.6	D	Message Receipt
3.2.1.6.1	D	Queue
3.2.1.6.1.1	D	Viewing
3.2.1.6.1.2	D	Storage Location
3.2.1.6.1.3	D	Protection
3.2.1.6.1.4	D	Non-Retention

Paragraph	Verification Method	Requirements
3.2.1.6.1.5	Д	Indicators
3.2.1.7	n/a	Acknowledgements and Non-Acknowledgement
3.2.1.7.1	T	Transmit
3.2.1.7.2	T	Receive
3.2.1.8	n/A	Storage
3.2.1.8.1	D .	Separate - An analysis shall be provided by the contractor, in addition to a Formal Demonstration.
3.2.1.8.2	D	Stability - An analysis shall be provided by the contractor in addition to a Formal Demonstration.
3.2.1.8.2.1	. D	Loss of Power - An analysis shall be provided by the contractor in addition to a Formal Demonstration.
3.2.1.8.3	D 73	Transfer - An inspection shall be made by the Government; the contractor shall provide an analysis in "addition to a formal test.

Paragraph 3.2.1.9	Verification Method N/A	Requirements Operator Signals
3.2.1.9.1	T	Visual - Demonstration shall be integrated into a formal test.
3.2.1.9.1.1	D	Received Message
3.2.1.9.1.2	D	Acknowledgement Indicator
3.2.1.9.1.3	ם	Non-Acknowledgement Indicator
3.2.1.9.2	Ţ	Audible - Demonstration shall be integrated into a formal test.
3.2.1.9.2.1.	D	Message and Ack/NAK
3.2.1.9.2.2	D	Keyboard
3.2.1.10	n/a	Controls
3.2.1.10.1	n/a	Hardware
3.2.1.10.1.1	I	Rotary

tests, the operators shall be seated,

centered with respect to the device,

so that initially the normal viewing

distance between the plane of the

	Verification	
Paragraph	Method	Requirements
3.2.1.10.1.2	D	Switch - The Government shall perform
		an inspection during Formal Demonstratic
3.2.1.10.2	D	Software - The contractor shall provide
		an analysis, in addition to a
		Formal Demonstration.
3.2.1.10.2.1	D	Initialization Default Values
3.2.1.11	T	Legibility - Prequalification test shall
		be performed and witnessed by governmen
		as early in the program as practicable;
		use of a breadboard model is permitted.
		Final acceptance shall be made during
		the final qualification
		tests to be conducted on the assembled
		unit. The tests shall be conducted in
		accordance with the following procedure
		(1) Four operators shall be selected
		who have normal color vision and 20/20
		(corrected) visual accuracy. For the

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Verification Method

Paragraph

3.2.1.11 (continued)

Requirements

position shall be 24 inches. The horizontal centerline of the device shall be at eye level. The legibility tests shall be performed with an ambient light intensity of 10⁻³ ft. candles and 10¹ ft candles incident on the surfaces to be tested.

(2) The first series of tests shall be conducted at the normal viewing angle. The same ten (10) dissimilar messages shall be required to be read by each operator. The number of characters read in error shall be recorded, along with the particular character in error and its. postiion on the dispaly. Correct recognition of at least 97 percent of the total characters, as an average, under each ambient lighting conditions shall be achieved for acceptance and before proceeding onto the next series of tests. The alphanumeric keyboard and indicators shall be read without error.

Verification Method

Paragraph

3.2.1.11 (continued)

Requirements

- (3) The second series of tests shall be conducted with the device rotated 20° on its horizontal axis in a direction away from the operators. The test shall then proceed as in paragraph (2) with the same ten different messages.

 Measurements shall be taken as in paragraph (2) with the same acceptance criteria.
- (4) The first two series of tests shall be repeated with the operators placed at a position ±20° to the normal, with respect to the vertical axis.

 Acceptance criteria shall remain the same.
- (5) The indicator shall be able to be correctly read within the volume formed by an angular sector with the radius equal to 24 inches and the angle of the vertex being 90° (±45° to the normal to the front face of the device), rotated 180° about the normal axis.

Paragraph	Verification Method	Requirements
3.2.1.11.1	T	Display and Keyboard
3.2.1.11.2	T	Operator Signals
3.2.1.12	D	Operator Tests - The Government shall inspect the CI, in addition to the Formal Demonstration.
3.2.1.12.1	n/A	Visual
3.2.1.12.1.1	מ	Display

Paragraph	Verification Method	Requirements
3.2.1.12.1.2	D	Visual Indicators
3.2.1.12.2	Д	Audible
3.2.1.12.3	D	Operability
3.2.1.13	D	Operation Without Connector Caps
3.2.1.14	D	Laser Interface
3.2.1.15	T	Memory Clear - Demonstration shall be integrated into a formal test.
3.2.2	N/A	Electrical Characteristics
3.2.2.1	מ	Power
3.2.2.1.1	D	Converter
3.2.2.1.2	T	Patteries - Government shall inspect CI, Batteries, Battery sources. The contractor shall provide an analysis in addition to a formal test.

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Paragraph	Verification Method	Requirements
3.2.2.1.2.1	T	Level Indicator - Demonstration shall
		be integrated into a formal test.
3.2.2.1.3	T	Battery Utilization - The Government
		shall inspect CI. The contractor
		shall provide an analysis, in addition
		to a formal test.
3.2.2.2	T	Electrical Interface - Demonstration
		shall be integrated into a formal test.
3.2.2.2.1	T	Output
3.2.2.2.2	T	Input
3.2.2.3	T	Laser - Demonstration shall be
		integrated into a formal test.
3.2.3	N/A	Physical Characteristics
3.2.3.1	I	Size - The contractor shall measure
		and record the CI dimensions.

Paragraph	Verification Method	Requirements
3.2.3.2	I	Weight - The contractor shall weigh
		and record the weight of a deliverable
		CI and each respective sets of cables
		separately.
3.2.3.3	T	Battery Compa-tment - The CI shall
		be inspected during formal test.
3.2.3.4	I	Strain Relief
3.2.3.5	D	Mounting - The Government shall inspect
		the CI in transport mode, in addition
		to Formal Demonstration.
3.2.4	T	Reliability - The contractor shall
		provide an analysis in addition to
		a formal test. A reliability test
		shall be conducted in accordance
		with MIL-SID-781, except as modified
		below.

3.2.4 (Continued)

Requirements

- (1) Test Type: Life test terminated in 60,000 activations with replacement (repair) of failed samples.
 - a. Discrimination ratio: 3:1
 - b. Test Sample: 4 DMDs
- (2) Test Description: Place 4 DMDs on test and perform the phases shown in table 9. Each phase shall be completed prior to the start of the next phase.
- a. Duty Cycle: Each DMD shall be subjected to the 11 minute duty cycle shown in figure 8. There shall be no time gap between duty cycles.
- a message composition display, edit, and transmission of a message reception and display. The time indicated for each activation shall be totally utilized. The time associated with each segment of an activation shall closely approximate, if not equal,

3.2.4 (Continued)

Requirements

the times specified herein. The transmission, reception, and display of Acknowledgements and non-acknowledgements shall be made part of the activation times.

The display brightness shall be set at a level consistent with legibility requirements under the ambient lighting condition of approximately 2,000 ft. candles incident on the surface of the display.

Audible signals shall be set at full level.

- c. Message Sequence: The following sequence of message is suggested:
 - Fire Request Grid Coordinates,
 Format #1
 - 2. Message to Observer, Format #19
 - 3. Subsequent Adjustment, Format #4
 - 4. Subsequent Adjustment, Format #4
 - 5. End of Mission, Format #7

3.2.4 (Continued)

Requirements

- (3) Demonstration of Compliance:
 Upon completion of 60,000 activations,
 a compliance decision shall be made
 as follows:
- a. The DMD shall be considered to comply to the requirement of paragraph 3.2.4 with four or less chargeable failures.
- b. The DMD shall be considered to be noncompliant with the requirement of paragraph 3.2.4 with five or more chargeable failures.
- (4) Failure Categories: The contractor shall tentatively classify each test failure into two main categories,
- (a) chargeable and (b) nonchargeable. The Government shall make a final determination of chargeability at the test conclusion. Chargeable failures shall be counted toward test compliance.

3.2.4 (Continued)

Requirements

- a. Chargeable Failures:
- Failures shall be classified chargeable in accordance with paragraph 5.5.1 of MIL-STD-781.
- b. Nonchargeable Failures:All failures not classified as chargeable to include:
- (1) Human errors in operation and maintenance.
 - (2) GFE equipments.
- (3) Test equipment excluding BITE.
 - (4) Test set-up errors.

PHASE	TEMPERATURE °C	VIBRATION*	ACTIVATIONS PER DMD
1	25 <u>+</u> 5	Yes	3,000
2	0 <u>+</u> 5	Yes	1,500
3	50 <u>+</u> 5	Yes	10,500

^{*} See paragraph 5.3.2 of MIL-STD 781

TABLE 9

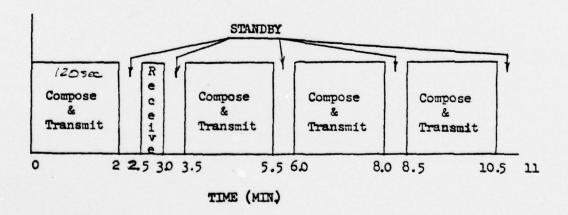


FIGURE 8 - DUTY CYCLE

Paragraph	Verification Method	Requirement
3.2.5	A	Maintainability - The Government shall
		inspect CI, in addition to analysis.
3.2.5.1	A	Operator Maintenance - The Government
		shall inspect CI, in addition to analysis
3.2.5.1.1	D	Adjustments - The Government shall
		inspect CI, in addition to contractor
		performed formal demonstration.
3.2.5.1.2	D	Scheduled Maintenance
3.2.52	N/A	Organizational Level Maintenance
3.2.5.2.1	T	Mean Time to Repair - Compliance
		with the requirements of the spec-
		ification shall be demonstrated during
		a Maintainability Demonstration Test
		using test B, method 1, MIL-STD-471.
		Test design parameters to be used are:
		Desired MTTR= 20 minutes
		Maximum tolerable MTTR= 40 minutes
		Consumer's risk = 10%
		Producer's risk = 10%
		The contractor shall estimate the
	0-	value of the variance from prior

Paragraph	Verification Method	Requirement
3.2.5.2.1 (continued)		experience. The variance estimate
		shall be subject to government
		approval.
3.2.5.2.2	T	Built-In-Test-Equipment (BITE) -
		The contractor shall provide an
		analysis in addition to Formal
		Maintainability Demonstration Test.
3.2.5.2.3	_ D	LRU Adjustment - To be verified
		under the Maintainability Demonstration
		Test
3.2.5.2.4	A	Higher Level Maintenance
3.2.5.3	D	Service & Access - The Government
		shall inspect the CI during the
		demonstration. In addition, a Formal
	•	Maintenance Engineering Evaluation
		(MEE) shall be conducted in
		accordance with USAECOM Directorate
		Maintenance Engineering Memorandum

Paragraph 3.2.5.3 (continued)	Verification Method	Requirements Number 750-5, with published changes, entitled "Maintenance of Supplies and Equipment, Maintenance Evaluation.
3.2.5.4	D	Tools- The Government shall inspect the tools during the demonstration, in addition to a Formal Maintenance Engineering Evaluation (MEE) which shall be conducted in accordance with USAFCOM Directorate Maintenance Engineering Memorandum Number 750-5, with published changes.
3.2.5.5	T	Test Provisions - Government shall require the contractor to provide an analysis preceding formal test.
3.2.6	T	Environmental Conditions - The DMD shall be subjected to the following MIL-STD-810 tests. The DMD shall

Verification Paragraph Requirements Method 3.2.6 (Continued) be tested with its battery installed. The DMD shall be powered by either the installed battery or by the external power source. The equipment shall be fully operational prior to, during, and following the tests as required by the test procedures specified herein. Each operational test shall include, but not necessarily be limited to, a demonstration of the following paragraphs, in accordance with a government approved scenario. 3.2.1.1 - 3.2.1.15 Inclusive 3.2.2.1 - 3.2.2.2 Inclusive 3.2.3.3 3.2.6.1 N/A Temperature 3.2.6.1.1 T High Temperature - Method 501, MIL-STD-810 Procedure II shall be employed. Operating

temperature (Step 7) shall

	ification Method	Requirements
3.2.6.1.1 (Continued)		be 71°C (160°F) which includes the
		effects of solar radiation).
3.2.6.1.2	T	Low Temperature - Method 502, MIL-
		STD-810, Procedure I shall be
		employed. The storage temperature
		(Step 2) shall be -62° C (-80° F)
		and shall be maintained for a period
		of not less than 2 hours following
		stabilization of the test item.
		Low operating temperature (Step 4)
		shall be -40° C $(-40^{\circ}$ F).
3.2.6.2	T	Humidity - The DMD shall be subjected
		to the humidity test specified in
		Method 507, Procedure III of MIL-STD-
		810. Operational test will be con-
		ducted during the last 5-hour period
		of each 48-hour cycle in Step 6, and
		at the end of each 24 hour period
		during the 480 hour period in Step 8.
		Wiping of the display and keyboard
		with clothing is permitted during
		the operation of the DMD. In Step 7

each 30 minute rain period. Wiping

of the display and

Paragraph	Verification Method	Requirements
3.2.6.2 (continued	a)	The DMD shall be opened so as to
		expose to the chamber environment areas
		normally sealed during operation by
		gasket or other non-hermetic scal.
3.2.6.3	T	Dust - The DMD shall be subjected to
		the dust test specified in Method 510,
		Procedure I of MIL-STD-810, with
		operation during Step 5. The DMD
		will be rotated on each of its six side:
		for one hour each during non-operating
		six hour time in Steps 1 and 3.
3.2.6.4	T	Rain - The DMD shall be subjected to
		the rain test specified in Method
		506, Procedure I of MIL-STD-810,
		with operation during times specified
		in Procedure I. For each 30 minute
		period, the wind will remain on for
		15 minutes before being shut off, as
		described in Procedure I. The DMD will
		be operated for the last 10 minutes of

Paragraph	Verification Method	Requirements
3.2.6.4 (Continued)		keyboard with clothing is permitted
		during the operation of the DMD.
3.2.6.5	T	Altitude - MIL-STD-810 - Method 500,
		Procedure I, shall be employed
3.2.6.6	T	Vibration - Mounting techniques
		(1) The equipment in its combat trans-
		portation mode (in its transit or
		combination transit case, if any,)
		shall be attached to the vibrator
		exciter table by its normal mounting
		means or by means of a rigid fix-
		ture capable of transmitting the
		vibration conditions as specified
		herein. Precautions shall be taken
		in the establishment of mechanical
		interfaces to minimize the introduction
		of undesirable responses in the test
		setup. Whenever possible the test
		load shall be distributed uniformly

MAGNAVOX GOVERNMENT AND INDUSTRIAL ELECTRONICS CO FO--ETC F/G 19/5
PRIME ITEM DEVELOPMENT SPECIFICATION FOR DIGITAL MESSAGE DEVICE--ETC(U)
APR 75
DAAB07-76-C-1677 AD-A061 374 UNCLASSIFIED EL-SS-2603-TF NL 2007 AD A061 374 END DATE FILMED 2-79 DDC

Paragraphs

3.2.6.6 (Continued)

Requirements

on the vibrator exciter table in order to reduce to the smallest amount, effects of unbalanced loads. Vibration amplitudes and frequencies shall be measured by techniques that will not significantly affect test item input control or response. The input control sensing device(s) shall be rigidly attached to the vibration table or to the intermediate structure, "if used", at or near as possible to the attachment point(s) of the test item.

(2) Cycling. The test item shall be vibrated along each of its three mutually perpendicular axis in accordance with Test Level, Frequency Range, and Time Schedule outlined below. The frequency of the applied vibration shall be swept logarithmically over the specified frequency range.

Paragraphs	Verification Method	Requirements	
3.2.6.6 (Contin	ued)	Test Level:	1.5 G's
		Frequency Range:	5 to 200 Hz
		Time Schedule:	84 minutes per axis
		Sweep Rate:	5 - 200 - 5 Hz in twelve (12) minutes
		At the conclusion	of the above test,
		visually inspect	the test item for
		any evidence of m	echanical damage
		and operate the t	est item and compare
		the results with	preperformance test
		data.	
3.2.6.7	T	Bounce, Loose Car	go - Method 514,
		MIL-STD-810 , Pro	cedure XI, Part 2,
		shall be employed	•
3.2.6.8	T	Shock Transit Dro	op - Method 516,
		MIL-STD-810 , Pro	cedure II, shall be
		employed.	
3.2.6.9	T	Shock, Bench Hand	iling - Method 516,
		MIL-STD-810, Pro	ocedure V of MIL-
		STD-810 shall be	employed.
3.2.6.10	T	Salt Fog - The ed	quipment shall be
		subjected to the	test of Method
		509, Procedure I	, of MIL-STD-810.
		Operation of the	equipment

Paragraphs

3.2.6.11

Verification Method

3.2.6.10 (Continued)

T

Requirements

is not required and failure criteria shall be limited to corrosions of finished and metals and to the clogging or binding of mechanical moving parts. Corrosion shall be defined as any visible degradation of the equipment surfaces that can be attributed to flakey, pitted, blistered, or otherwise loosened finish or material surface. All mechanical moving parts (switches, push buttons, etc.) shall be operated following the test to insure that no binding or clogging has resulted. Fungus Resistance - Parts and subassemblies of the DMD in the assembled and as ready for delivery condition, shall be subjected to 28 days of Method 508, MIL-STD-810. The equipment test parts/sub-assemblies shall not be specially cleaned for the fungus test, except for the cleaning it received during or after production.

3.2.6.11 (Continued)

Requirements

If it is necessary for the manufacturer after assembly to remove accumulated production and handling contaminants by cleaning prior to packaging and delivery, the equipment parts/subassemblies shall not be tested for three days after cleaning to allow for complete evaporation of the cleaning compound. All enclosed or gasketed assemblies shall be opened and the interior sprayed with the specified mixed spore suspension. After 14 and 28 days of test, the control items per paragraph 3.1.3 and 3.1.4 of Method 508, MIL-STD-810 shall show profuse growth over at least 50% of the area of the control items. After 28 days, based upon visual examination, the equipment assembly shall pass if it shows no more growth than that specified in 3.2.6.11.

Verification Method

Requirements

3.2.6.11 (continued)

No operational test is required after the fungus test to pass the test.

The part or sub-assembly shall fail if it shows more than the growth specified above. The test shall be repeated if the control items fail to show profuse growth after 14 and 28 days of test.

Test data on representative parts and materials may be submitted to the government for approval, in lieu of actual testing to demonstrate compliance with MIL-SID-454.

3.2.6.12

T

Emplosive Atmosphere - The DMD shall be subjected to Method 511, Procedure I of MIL-STD-810.

3.2.6.13

T

Immersion - The DMD shall be subjected to the test Method 512, Procedure I of MIL-STD-810.

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Paragraph	Verification Method	Requirements
3.2.6.14	T	Orientation - The DMD shall be
		operated for a minimum of five
		minutes during inclination
		in each plane(forward, backward,
		left, right) to an angle of
,		90 <u>+</u> 3 degrees.
3.2.6.15	T	Icing (Freezing Rain) - This
		test shall be conducted in accordance
		with the following procedure:
		a. Reduce the chamber
		temperature to minus 17.8 degrees
		Centigrade (O°F) and allow the
		test item temperature to
		stabilize.
		b. Raise the chamber temperature
		to minus 6.7 degrees Centigrade
		(20°F) and start rainfall.
		c. Simulate a rainfall of from
		0.1 to 1.0 inch per hour and
		maintain it until a 0.5 inch layer of
		ice is deposited on the test item.

Paragraphs	Verification Method	Requirements
3.2.6.15 (Conti	nued)	NOTE: The simulated rain shall be
		introduced through spray nozzles
		located at the top of the chamber.
		Specific instruction concerning
		rainfall, size of droplets, direction
		etc. are in MTP 5-2-591.
		d. Visually inspect the test item.
		e. Return test item to ambient
		conditions and allow ice deposit to
		melt.
		f. Functionally operate the test
		item, less packaging materiel.
		g. Record all specified operating
		characteristics.
		Vite
		h. Return the chamber temperature
		to ambient conditions at the comple-
		tion of the rainfall.
3.2.6.16	A	Snow
3.2.6.17	T	Temperature Shock - The DMD shall be
		subjected to the temperature shock
		test specified in Method 503, Proced-

wre I of MIL-STD-810.

Paragraph	Verification Method	Requirements
3.2.6.18	T	Sunshine - The DMD shall be subject
		to the sunshine test specified in
		Method 505. Procedure II, of
		MIL-STD-810, with operation during
		the times specified in Procedure II.
3.2.6.19	T	Chemical Biological (CB).
		The DMD shall be subjected to the
		Chemical & Biological agents.
3.2.6.19.1	T	Decontamination - The DMD shall be
		operated after the decontamination
		procedures of 3.2.6.19.1.
3.2.7	A	Useful Life - This requirement shall
		be verified by analysis using design
		documentation, maintenance character-
		istics, and component part character-
		istics.
3.3	n/A	Design and Construction
3.3		
3.3.1	N/A	Parts, Materials & Processes - The
3.3.2	4	Government shall inspect same, in
		addition to analysis.
	101	

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Paragraph	Verification Method	Requirements
3.3.1.1	A	Solid State Components
3.2.1.2	A	Finish - The Government shall inspect the equipment, in addition to contractor
3.3.1.3	A	Switches - The Government shall inspect the equipment, in addition to contractor's analysis.
3.3.1.4	1	Receptacle Caps
3.3.1.5	A	Fastner Hardware - The Government
		shall inspect the equipment, in
		addition to contractor's analysis.
3.3.1.6	A	Corrosion of Metal Parts - The
		Government shall inspect the equip-
		ment in addition to the contractor's
		analysis.

Paragraph	Verification Method	Requirements
3.3.2	T	Electromagnetic Compatibility -
		The Digital Message Device shall be
		tested for compliance with the require-
		ments of 3.3.2. Test methods and
		procedures shall be in accordance with
		MIL-STD-462, Notice 3.
		The Government shall require an
		analysis in addition to a demonstration.
		The demonstration shall be integrated
		into the formal test.
3.3.2.1	T	Electromagnetic Interference -
		The Government shall require an analysis
		in addition to a demonstration. The
		demonstration shall be integrated
		into the formal test.
		Bonds and Grounds - The Government
3.3.2.2	T	
		shall inspect in addition to formal
		test.
		Bonding resistance measurements shall
		be recorded and included in the
		EMI/EMC test report.

Paragraph	Verification Method	Requirements
3.3.2.3	T	Cables and Connectors - The
		Government shall inspect in addition
•		to formal test.
3.3.2.4	T	Tempest - A TEMPEST test shall be
		conducted on the DMD for compliance
		with the conducted and radiated
		emanations requirements of EL-SS-2604-T
		(Secret).
3.3.3	I	Marking
3.3.4	I	Workmanship - Shall meet provisions of
		MIL-STD-252, MIL-E-4158D and MIL-STD-
		454.
3.3.5	D	Interchangeability - The Government
		shall inspect the CI. The contractor
		shall provide an analysis, in addition
		to a Formal Demonstration.
3.3.6	. A	Safety - The Government shall inspect,
		in addition to evaluation of
	•	contractor's analysis.

Paragraph	Verification Method	Requirements
3.3.6.1	A	Personnel Safety - The Government
		shall inspect, in addition to
		evaluation of contractor's analysis.
3.3.6.1.1	A	Mechanical Safety - The Government
		shall inspect, in addition to
		evaluation of contractor's analysis.
3.3.6.1.2	A	Electrical Safety - The Government
		shall inspect, in addition to
		evaluation of contractor's analysis.
3.3.6.2	T	Equipment Safety - The Government
		shall inspect and evaluate contractor's
		analysis in addition to formal test.
3.3.6.3	N/A	Environmental Safety
3.3.6.3.1	A	Hazardous Environments - The Government
		shall inspect, in addition to
		evaluation of the contractor's analysis.

Paragraph	Verification Method	Requirements
3.3.6.3.2	A	Radioactive Materials - The
		Government shall inspect, in addition
		to evaluation of the contractor's
		evaluation.
3.3.7	T	Human Engineering - Human Engineering
		Testing shall be integrated into
		other tests described herein.
		Government shall inspect, evaluate
		contractors analysis in addition
		to a demonstration which shall be
		integrated into a formal test.
3.3.7.1	D	Mnemonics
3.3.7.2	T	Display Fields - The Government shall
		inspect key features. Demonstration
		shall be integrated into formal test
3.3.7.3	D	Entering Data
3.3.7.4	D	Numbers

Paragraph	Verification Method	Requirements
3.3.7.5	D	Configuration
3.3.7%	1	Labeling
3.3.7.7	D	Malfunction
3.4	I	Documentation
3.5	I	Logistics
3.6	1	Training

5.0 PREPARATION FOR DELIVERY

5.1 Preservation and Packaging. The DMD (CI), cable sets and Documentation shall be packaged in accordance with good commercial practice and in a manner that will afford protection against corrosion, deterioration and physical damage during direct shipment to the first receiving activity for immediate use. Marking of the interior and shipping containers will be in accordance with MIL-STD-129.

The CI shall be cleaned, preserved, and packaged for protection against corrosion, other forms of deterioration, and physical damage during shipment from the contractor's facility to the point of destination. The protective processes to be used shall be the minimum required for adequate protection under conditions of normal handling, shipment, and anticipated storage. The methods employed shall be generally selected from those described in Specification MIL-P-ll6. Special packaging designs, when applicable, shall be developed using MIL-P-9024 as a guide. Preservation and packaging level shall be in accordance with FED-STD-102.

5.1.1 Preservation Materials. Preservative compounds shall not be applied if the necessary removal of such compounds prior to

service could not readily be accomplished in the field using available materials and equipment. Instead, alternate methods affording equal or better protection shall be used.

5.1.2 Packaging Materials. Packaging materials used shall be consistent with good commercial practice and shall comply with all applicable carrier and safety regulations. Where warranted, special packaging and transportation method shall be used to provide adequate protection and control during shipment.

5.2 Packing.

Packing shall be the minimum required to ensure adequate protection to the CI in consideration of the modes of transportation, the distance to be traversed, the climatic conditions prevailing, and the mechanics of handling during loading and unloading.

Packing level shall be in accordance with FED-STD-102.

5.3 Marking.

Marking shall be in general accordance with the requirements of MIL-STD-129 and shall have the following minimum information legibly marked or labeled.

- a. Contractor's Part Number
- b. Contractor's Name

- c. Serial Number or Lot Number, as applicable
- d. Procuring Activity Purchase Order Number
- e. Quantity

6.0 NOTES

6.1 Ordering Data.

Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Any exceptions to this specification.
- c. Whether special preservation, packaging and marking is required.
 - d. Assigned activity for testing.
- 6.2 <u>Definitions</u>. The following is a list of acronyms and special terms used within the specification:

ARTADS	Army	Tactical	Data	Systems

ASCII American Standard Code
Information Interchange

BDE Brigade

BN Battalion

Branching Branching is a connected arrangement of filaments (hyphae) formed by shoots or secondary stems growing from the main stem or

from the main stem o filament (hypha).

CAV Cavalry

CBT Combat

CCU Communication Control Unit

CI Configuration Item

Data Element

A character or string of characters which may be used in a field as described in Appendix I.

Data Element Name

A humanly understandable descriptor associated with one and only one Data Element.

DDT Digital Data Terminal

DIV Division

DMD Digital Message Device

ECOM Electronics Command (Ft. Monmouth, New Jersey)

EDC Error Detection Correction

FDC Fire Direction Center

Field A position or group of positions in a format, as described in Appendix I.

Field Name

A humanly understandable descriptor associated with one and only one field within a format.

Format A combination of fields as described in Appendix I.

Format Name

A humanly understandable descriptor associated with one and only one format.

FSE Fire Support Element

FSK Frequency Shift Keying

Growth Colonization

Growth colonization is a mass of individual plants, generally of one species, living together; or a group of hyphae which is formed from one spore or cell and may be one individual plant. Colonization which completely covers the surface of the nutrient material constitutes abundant growth.

Legal Entry

For a given field, one of the set of data elements which may be inserted in accordance with Appendix I.

Microbial Growth.

Microbial growth is the growth of very minute organisms.
Such organisms when present in large numbers may provide a colony visible to the naked eye.

OPM, ARTADS

Office of the Project Manager, ARTADS

QCS

Query Control Station

Sporulation

Sporulation is the formation of minute unicellular reproductive or dormant bodies, called spores.

SWBD

Switchboard

TACFIRE

Tactical Fire Direction System

TDC

Time Dispersed Coding

Tubular Germination

Tubular germination is partial growth by the production of hyphae, which are tubular shaped fungal filaments. Tubular germination constitutes restricted individual spore growth not proceeding to colonization.

VFMED

Variable Format Message Entry Device

Life Expectancy

Life expectancy is defined as the period from the time of delivery of the CI to the procuring agency until identity of the CI is destroyed by classification as salvage or is subjected to cannibalization.

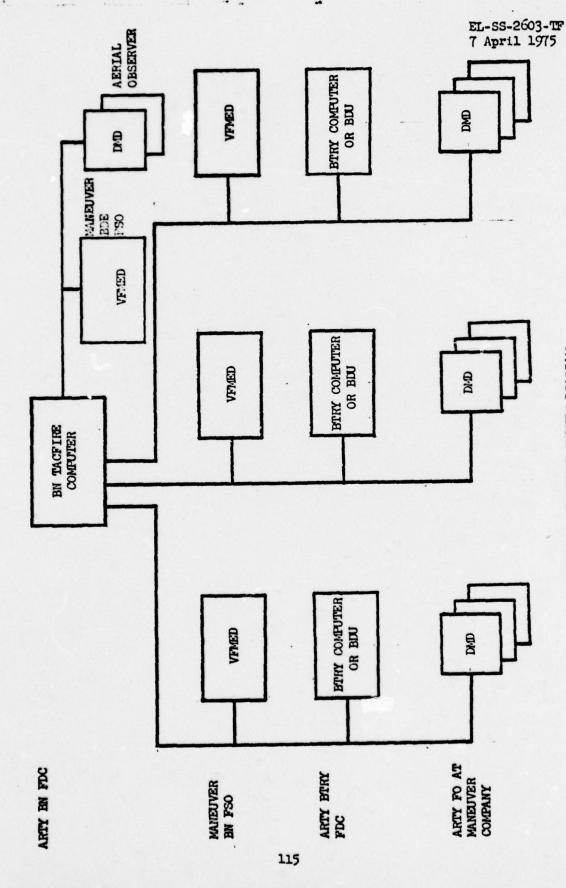


FIGURE 1. TACFIRE SYSTEM DIAGRAM

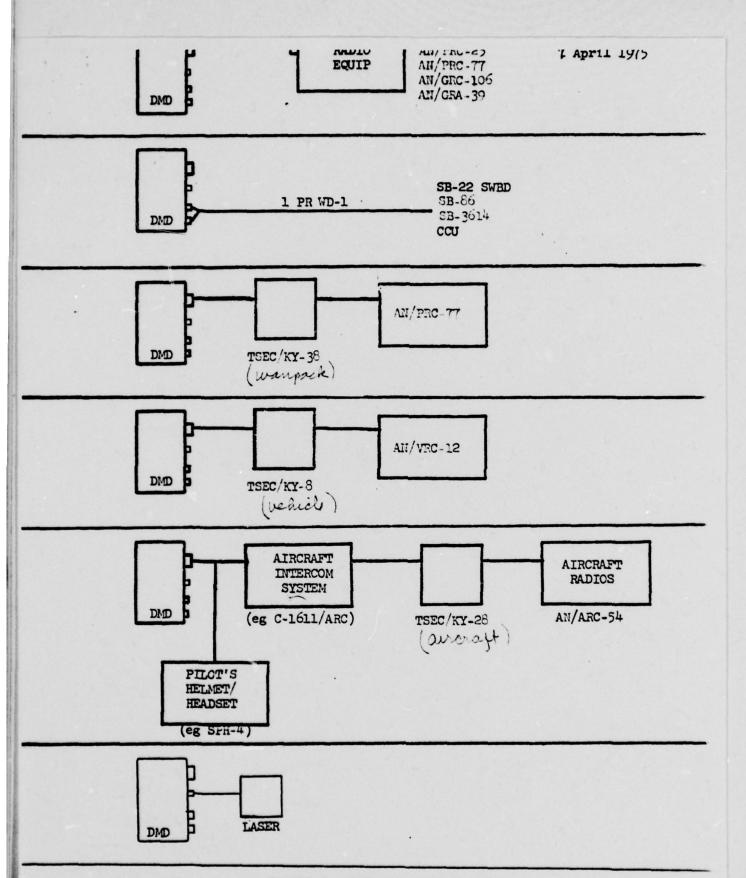


FIGURE 2. DMD OPERATIONAL MODES
116

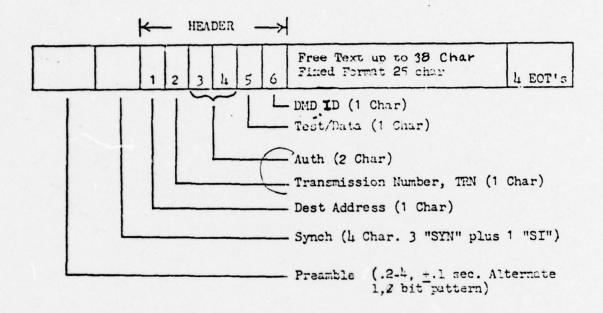


Figure 3. Data Messago Format

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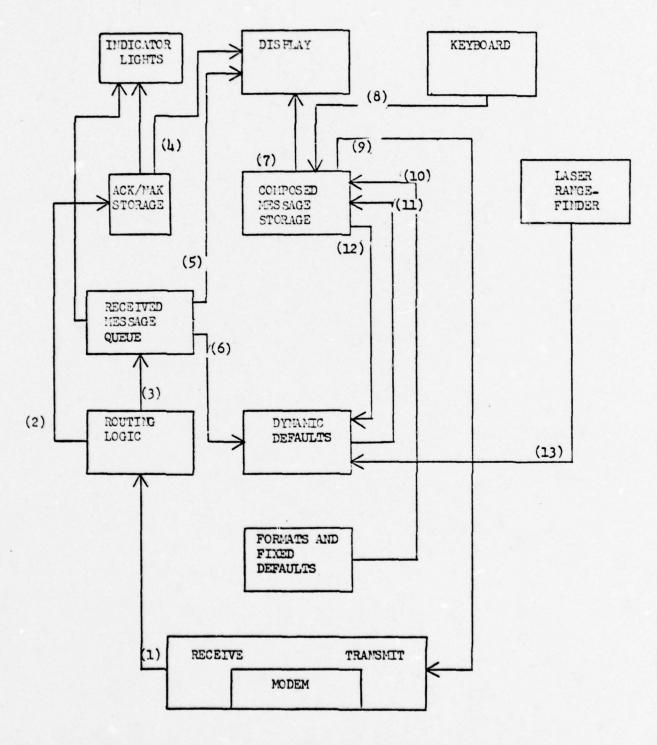


FIGURE 4. DMD INFORMATION TRANSFER (PARENTHETICAL NUMBERS REFER

PREAMBLE	SYHC	В1	B2	В3	B4	85

SINGLE BLOCK

PREAMBLE SYNC B1	B1 B2	B2	B3 B3	B4	BL	B5	B5

DOUBLE BLOCK

Block 1 = Char 1-16 Block 2 = Char 17-32 Block 3 = Char 33-48 Block 4 = Char 49-64 Block 5 = Char 65-80

Figure 5. Single and Double Block Transmission

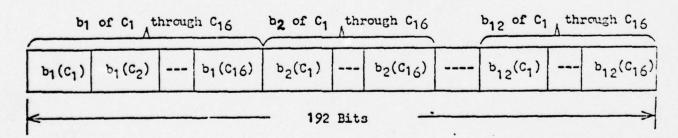


Figure 6. Time Dispersed Coding

-

Bit	1234	71 91 51 41 61 21 11 01 0 8 2 9 5 4 5 2 1	22.2	γĄ	14 45 46 47 48
. Contents	8 6 6	Value of Pange to nearest 10 meters (3 BCD Digita)	Value of Azimuth in Mile (4 BCD Digits)	Value of Elevation in Mile (3 BCD Digits)	Her Elev Her Elev
· Description	буще	2000 1000 2000 1000 200 100 200 100 80 40 20	8000 4000 2000 1000 800 100 80 40 20 10 8 4 2 1 8 20 10 8 4 20 10 8 10 20 10 8 10 20 10 10 10 10 10 10 10 10 10 1	800 400 200 100 80 40 20- 10 8 4	
		•	٠	Pradition of accord	

with so ter spor" Bit $b \le 1s$ set to one if elevation is negative. Bit $b \le 1s$ set to one if word is invalid. Bits 1, 2, 3, b, and $b \ne 1$ contain zeroes under all eircumstances. Bit $b \le 1s$ odd parity on the entire word. ELECTRICAL VALUES AND TRAING:
1. IAle state 0 to 0.4v.
2. Active state 5.5 to 2.4v. NOTES:

Dele zero 5 microsecond pulse. 1 |
Dele one 15 microsecond pulse. 1 |
Clock period 80 microseconds 1 |

Connector: NSW 5935-328-0666

1. GLID concector: NSW 5935-328-0666

2. Pin assignment: Computer word little "f"

Return

Lage command little "h"

Jetting Comp

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Requires 5 volts to be applied for a duration of 3 seconds, at 20 milliamps. 10 manps DESIGNATE COMMAND:

500 x 250/6

TTL Lope in Dut

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Table	1.	Keyboard	Characters	and	Operational	Codes
	T					

Table		d onardou	10 4.14			
Column			2	3	4	5
b7 b6 b5	000	0 1	0 1 0	0 1 1	100	101
Ե ԱԵ3Ե2Ե1						
0000			SP	ø		P
0001				1	A	Q
0010				2	В	R
0011				3	С	s
0100	EOT		,	4 .	D	T
0101		NAK		5	E	υ
0110	ACK	SYN		6	F	₹ .
0111				7	G	W
1000				8	H	X
1001				9	I	Y
1010				:	J	Z
1011			+	5	К	
1100			,		L	
1101			-		М	
1110					N	
1111	SI		1		0	

TABLE 2 DMD INFORMATION TRANSFER (to be used with Figure 4)

1. RECEIVED MODEM TO ROUTING LOGIC

- A. ALL FIXED FORMAT MESSAGE
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
 - 2) CONDITION OF TRANSCRIPTION: UPON RECEIPT OF MESSAGE
 - 3) REMARKS: None
- B. ACKNOWLEDGEMENTS/NONACKNOWLEDGEMENTS
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
 - 2) CONDITION OF TRANSCRIPTION: UPON RECEIPT OF ACK/NAK
 - 3) REMARKS: None

2. ROUTING LOGIC TO ACK/NAK STORAGE

- A. ACKNOWLEDGEMENTS/NONACKNOWLEDGEMENTS
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
 - 2) COMDITIONS OF TRANSCRIPTION: UPON RECEIPT OF ACK OR MAK
- 3) REMARKS: Receipt of a new ACK or NAK will cause an overwrite of an ACK or NAK which is still in storage, if the operator has not cleared the old one.
- 3. ROUTING LOGIC TO RECEIVED MESSAGE QUEUE
 - A. ALL FIXED FORMAT MESSAGES
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
 - 2) CONDITION OF TRANSCRIPTION: UPON RECEIPT OF MESSAGE
- 3) REMARKS: If there are two messages already in storage a new one will not be accepted into the received message queue until there is room.

4. ACK/NAK STORAGE TO DISPLAY

A. ALL ACKNOWLEDGEMENTS

- 1) FIELDS TO BE TRANSFERRED: (SEE TABLE 3)
 "NUMBER" (POSITION 2 IN HEADER)
 "AUTH" (POSITIONS 3, L IN HEADER)
 "ORIGINATOR" (POSITION 6 IN HEADER)
- 2) CONDITIONS OF TRANSFER: THE CONDITION OF TRANSFER MAY BE BY OPERATOR ACTION OR AUTOMATICALLY.
- 3) REMARKS: When displayed "ACK" will be displayed to the operator.

B. ALL NON ACKNOWLEDGEMENTS

- 1) FIELDS TO BE TRANSCRIBED: (FROM TABLE 3)
 "NUMBER" (POSITION 2 IN HEADER)
 "AUTH" (FOSITIONS 3, L IN HEADER)
 "ORIGINATOR" (POSITION 6 IN HEADER)
 "NUMBER" (POSITIONS 9, 10)
- 2) CONDITIONS OF TRANSCRIPTION: THE CONDITION OF TRANSFER MAY
 BE BY OPERATOR ACTION OR AUTOMATICALLY.
- 3) REMARKS: When displayed "NAK" will be displayed to the operator.

5. RECEIVED MESSAGE QUEUE (RMQ) TO DISFLAY

- A. ALL FIXED FORMAT MESSAGES
 - 1) FIELDS TO BE TRANSFERRED: ALL FIELDS (subject to Appendix 2)

- 2) CONDITION OF TRANSFER: UPON OPERATOR ACTION
- 3) <u>REMARKS</u>: When an operator calls up a message from the RMQ the message will be cleared from the RMQ making room in the RMQ for receipt of a new message.
- 6. RECEIVED MESSAGE QUEUE (RMQ) TO DYNAMIC DEFAULTS
 - A. MESSAGE TO OBSERVER (MTO, FOLMAT #19)
 - 1) FIELDS TO BE TRANSCRIBED:

 "TARGET NUMBER" (CHAR POS 8-15)

 "FIRE MISSION BUFFER" (CHAR POS 42)
- 2) CONDITION OF TRANSCRIPTION: ON ENTRY OF MTO INTO RMQ (SEE REMARKS)
- 3) REMARKS: The "target number" is to be associated with the proper fire mission sequence. This will be done by using the "FIRE MISSION BUFFER" number. A 1 or 2 gives the proper fire mission sequence for association. If "NOT GIVEN" or any other character besides 1 or 2 is in character position 42 transfer will not take place.
 - B. HIGH BURST MEAN POINT OF IMPACT (HB/MPI FORMAT #6)
 - "REFERENCE DIRECTION" (CHAR FOS 8-11)

 "REFERENCE VERTICAL ANGLE" (CHAR FOS 13-16)

 "TARGET NUMBER" (CHAR FOS 22-29)

 "TYPE REG AND OBS VERT ANGLE" (CHAR FOS 31)
 - 2) CONDITIONS OF TRANSCRIPTION: ON ENTRY OF HB/MPI INTO RMQ
- 3) REMARKS: This information will be copied into the Dynamic Defaults and it will overwrite the last entries, if any.

7. COMPOSED MESSAGE STORAGE (CMS) TO DISPLAY

- A. ALL FIXED FORMAT MESSAGES
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
 - 2) CONDITION OF TRANSCRIPTION:
 - a. UPON ACTION OF THE OPERATOR TO CALL UP A COMPOSED MESSAGE
 - b. DURING COMPOSITION ENTRIES MADE WILL BE BROUGHT UP AND

DISPLAY AS THEY ARE MADE

- 3) REMARKS: The composed message transcribed to the display will the one assiciated with the active FIRE MISSION sequence.
- 8. KEYBOARD TO COMPOSED MESSAGE STORAGE
 - A. FOR ALL LEGAL ENTRIES
 - 1) LEGAL ENTRIES TO BE TRANSFERRED: ALL
 - 2) CONDITIONS OF TRANSFER: UPON OPERATOR ACTION
 - 3) REMARKS: None

9. COMPOSED MESSAGE STORAGE TO TRANSMIT

- A. ALL FIXED FORMAT MESSAGES
 - 1) FIELDS TO BE TRANSCRIBED: ALL FIELDS
- 2) CONDITION OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL
 - 3) REMARKS: None
- 10. FORMATS AND FIXED DEFAULTS TO COMPOSED MESSAGE STORAGE
 - A. ALL FIXED FORMAT MESSAGES
 - 1) FIELDS TO BE TRANSCRIBED: SEE APPENDIX 2 (SEE REMARKS)
- 2) CONDITION OF TRANSCRIPTION: UPON ACTION OF THE OPERATOR TO CALL UP A MESSAGE FORMAT INTO THE COMPOSED MESSAGE BUFFER.

- 3) REMARKS: Appendix 2 has all the defaults for the fixed format message entry fields.
- 11. DYNAMIC DEFAULTS TO COMPOSED MESSAGE STORAGE
 - A. SUBSEQUENT ADJUSTMENT (SUBQ ADJ, FORMAT #4)
 - 1) FIELDS TO BE TRANSFERRED:
 "DIRECTION" (TO POSITIONS 8-10)
 "TARGET NUMBER" (TO POSITIONS 22-29)
 "SHELL/FUZE" (TO POSITION 30)

"CONTROL" (TO POSITION 31)

- 2) CONDITIONS OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE SUBQ ADJ FORMAT
- 3) REMARKS: The "DIRECTION;" "TARGET NUMBER," "SHELL/FUZE" and "CONTROL" transferred will be those associated with the FIRE MISSION sequence active when the operator called up the SUBQ ADJ format
 - B. PRECISION ADJUSTMENT (PREC ADJ, FORMAT #5)
 - 1) FIELDS TO BE TRANSFERRED:

 "DIRECTION" (TO POSITIONS 7-9)

 "TARGET NUMBER" (TO POSITIONS 21-28)

 "CONTROL" (TO POSITION 31)
- 2) CONDITIONS OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE SPOTTING FORMAT.
- 3) REMARKS: The "DIRECTION," "TARGET NUMBER" and "CONTROL" transferred will be those associated with the FIRE MISSION sequence active when the operator called up the precision adjustment format.
- C. MEAN POINT OF IMPACT AND HIGH BURST REGISTRATION MESSAGE (HB/MPI, FORMAT #6)
 - 1) FIELDS TO BE TRANSFERRED:

"REFERENCE DIRECTION" (TO POSITION 8-11)

"REFERENCE VERTICAL ANGLE" (TO POSITION 13-16)

"TARGET NUMBER" (TO POSITIONS 22-29)

"TYPE REG AND OBS VERT ANGLE" (TO POSITION 31)

- 2) CONDITION OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE HB/MFI FORMAT
- 3) <u>REMARKS:</u> The entries in the fields in 1 will be those sent in the HB/MPI message last sent by the FDC or they will be the most recent entries made in those fields by the operator which ever is most recent.
 - D. END OF MISSION AND SURVEILLANCE MESSAGE (EOM & SURV, FORMAT #7)
 - 1) FIELDS TO BE TRANSFERRED:

 "DIRECTION" (TO POSITIONS 8-10)

 "TARGET TYPE" (TO POSITION 18)

 "TARGET SUBTYPE" (TO POSITION 19)

 "TARGET NUMBER" (TO POSITIONS 22-29)
- 2) CONDITIONS OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE EOM & SURV FORMAT.
- 3) REMARKS: The "DIRECTION", "TARGET TYPE", "TARGET SUBTYFE", and "TARGET NUMBER" will be those associated with the FIRE MISSION sequence active when the operator called up the EOM & SURV format
 - E. FIRE REQUEST USING LASER MESSAGE (FR LASER, FORMAT #17)
 - 1) FIELDS TO BE TRANSFERRED:
 "DIRECTION" (TO POSITIONS 8-11)

* See fortuate 14129

"SLANT DISTANCE" (TO POSITIONS 12-14)

"VERT ANGLE" (TO POSITIONS 16-20)

- 2) CONDITION OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE FR LASER FORMAT
- 3) REMARKS: The "DIRECTION", "SLANT DISTANCE", and "VERT ANGLE" transferred will be those associated with the FIRE MISSION sequence active when the operator called up the FR LASER format.

 If the format is being viewed in the display, the fields in PAR 1 will be overwritten by new laser information when the information is received through data path 13. (FIGURE 1)
 - F. SUBSEQUENT ADJUSTMENT USING LASER MESSAGE (SA LASER, FORMAT #18)
 - 1) FIELDS TO BE TRANSFERRED:

"DIRECTION" (TO POSITIONS 8-11)
"SLANT DISTANCE" (TO POSITIONS 12-14)
"VERT ANGLE" (TO POSITIONS 16-20) TOT NO (22-24)
"SHELL FUZE" (TO POSITION 30)
"CONTROL" (TO POSITION 31)

- 2) CONDITION OF TRANSFER: UPON ACTION BY THE OPERATOR TO CALL UP THE SA LASER FORMAT
- "SHELL/FUZE" and "CONTROL" transferred will be those associated with the
 FIRE MISSION sequence active when the operator called up the SA LASER
 format. If the format is being viewed in the display, the "DIRECTION,"

 "SLANT ANGLE" and "VERT ANGLE" will be overwritten by new laser information
 when the information is received through data path 13 (FIGURE 4). If the display the same than the second order.

easer wife will cause the fields in part to be oremetten by the new laser wife to be reculled

- G. FO COMMAND NESSAGE (FO CMD, FORMAT #21)
 - 1) FIELD TO BE TRANSFERRED:
 "TARGET HUMBER" (TO CHAR POS 9-16)
- 2) CONDITION OF TRANSFER: Upon action by the operator to call up the FO CMD Format.
- 3) REMARKS: The "TARGET NUMBER" will be that associated with the FIRE MISSION sequence active when the operator called up the FO CMD Format.
 - H. FR QUICK
 - 1) Field to be Transferred:
 - . "TARGET NUMBER" (to CHAR POS 9-16)
 - 2) Condition of Transfer: Upon action by the operator to call up the FR QUICK format.
 - 3) Remarks:

The "TARGET NUMBER" will be that associated with the FIRE MISSION sequence active when the operator called up the FR QUICK format.

12. COMPOSED MESSAGE STORAGE TO DYNAMIC DEFAULTS:

- A. FIRE REQUEST USING GRID COORDINATES (FR GRID, FORMAT #1)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-10)
"TARGET TYPE" (FROM POS 23)
"TARGET SUBTYPE" (FROM POS 24)
"SHELL/FUZE" (FROM POS 30)
"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF
 THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE
 MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - B. FIRE REQUEST USING SHIFT FROM A KNOWN POINT (FR SHIFT, FORMAT #2)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-10)
"TARGET TYPE" (FROM POS 23)
"TARGET SUETYPE" (FROM POS 24)
"SHELL/FUZE" (FROM POS 30)
"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.

- C. FIRE REQUEST USING POLAR COORDINATES (FR POLAR, FORMAT #3)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-11)
"TARGET TYPE" (FROM POS 23)
"TARGET SUBTYPE" (FROM POS 24)
"SHELL/FUZE" (FROM POS 30)
"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - D. SUBSEQUENT ADJUSTMENT (SUBQ ADJ, FORMAT #4)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-10)
"TARGET NUMBER" (FROM POS 22-29)
"SHELL/FUZE" (FROM POS 30)
"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE MODE
- 3) <u>REMARKS</u>: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - E. PRECISION ADJUSTMENT (PREC ADJ, FORMAT #5)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 7-9)

"TARGET NUMBER" (FROM POS 21-28)
"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF
 THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE
 MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
- F. MEAN POINT OF IMPACT HIGH BURST REGISTRATION MESSAGE (HB/MPI, FORMAT #6)
 - 1) FIELDS TO BE TRANSCRIBED:

"REFERENCE DIRECTION" (FROM POS 8-11)

"REFERENCE VERTICAL ANGLE" (FROM POS 13-16)

"TARGET NUMBER" (FROM FOS 22-29)

"TYPE REG AND OBS VERT ANGLE" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF
 THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE
 MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - G. END OF MISSION AND SURVEILLANCE MESSAGE (EOM & SURV, FORMAT #7)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-10)

"TARGET TYPE" (FROM POS 18)

"TARGET SUBTYPE" (FROM POS 19)

TABLE 2 Cont

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"TARGET NUMBER" (FROM POS 22-29)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF
 THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE
 MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - H. FIRE REQUEST USING LASER MESSAGE (FR LASER, FORMAT #17)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-11)

"SLANT DISTANCE" (FROM FOS 12-14)

"VERT ANGLE" (FROM POS 16-20)

"TARGET TYPE" (FROM POS 23)

"TARGET SUBTYPE (FROM POS 24)

"SHELL/FUZE" (FROM POS 30)

"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE MODE
- 3) REMARKS: The field entries in FAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - I. SUBSEQUENT ADJUSTMENT USING LASER MESSAGE (SA LASER, FORMAT #18)
 - 1) FIELDS TO BE TRANSCRIBED:

"DIRECTION" (FROM POS 8-11)

"SLANT DISTANCE" (FROM POS 12-14)

TABLE 2 Cont

"VERT ANGLE" (FROM POS 16-20)

"TARGET NUMBER" (FROM POS 22-24)

"SHELL/FUZE" (FROM POS 30)

"CONTROL" (FROM POS 31)

- 2) CONDITIONS OF TRANSCRIPTION: UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE OPERATOR LEAVES THE COMPOSED MESSAGE MODE
- 3) REMARKS: The field entries in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.
 - J. FO COMMAND MESSAGE (FO CMD, FORMAT #21)
 - 1) FIEID TO BE TRANSCRIBED:
 "TARGET NUMBER" (TO CHAR POS 9-16)
- 2) CONDITION OF TRANSCRIPTION:

 UPON OPERATOR ACTIVATION OF THE TRANSMIT CONTROL OR IF THE

 OPERATOR LEAVES COMPOSED MESSAGE MODE.
- 3) REMARKS: The field entry in PAR 1 shall be stored in association with the FIRE MISSION sequence active when the condition in PAR 2 occurred.

13. LASER RANGE FINDER TO DYNAMIC DEFAULTS

- A. LASER WORD
 - 1) FIELDS TO BE TRANSFERRED:

"DIRECTION"

"SLANT DISTANCE"

"VERT ANGLE"

- 2) CONDITIONS OF TRANSFER: WHEN THE LASER IS OPERATED THE INFORMATION WILL BE PASSED TO THE DMD
- 3) REMARKS: This information shall be stored in association with the FIRE MISSION sequence active when the information was passed from the laser to the DMD.

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SOUNCE	TYPE ACK/l'AK	Format & contents	INFORMATION DISFLAYED
(Computer Center)	ACK	PTGAMTLE[SYNC[1]2]3[4]5[6[7]8]EOT 1 - DESTINATION (1 CHAR) 2 - NUTBER (2 CHAR) 3,4 - AUTH (2 CHAR) 5 - NESCAGE TYPE ACK (5) 6 - ORIGINATOR (1 CHAR) 7,8 - TEXT (A, ACK)	6 - ORIG (1 CHAR) 2 - NUMBER (1 CHAR) 3, h - AUTH (2 CHAR) 1, IMDICATE "ACK"
	MAK	PREAMELE STOC 1 2 3 14 5 6 7 8 9 10 EOT	6 - ORIG (1 CHAR)
		3 - DESTINATION (1 CHAR) 2 - FUGBER (1 CHAR) 3,4 - AUTH 5 - IRSEAGE TYPE ACK (5) 6 - ORIGINATOR (1 CHAR) 7,8 - TEXT (A, MAK) 9,10 - MIMMER (2 CHAR)	2 - NUMBER (1 CHAR) 3, h - AUTH (2 CHAR) 9,10 - NUMBER (2 CHAR) IMDICATE "PAK"

TABLE 3 ACK/MAK FROM FDC TO DED

EL-SS-2603-TF 7 April 1975

DISHAYED DISHAYED		6 - CRIGITATOR . INDICATE "AUTO ACK"	
Type format & contents ack/?!ak		AUTO FREAMENTE STUDINE [3] [4] [5] [6] [7] [6] EGT ACK 1 - DEST DATION (1 CHAR) 2,3,1, - HOT USED 5 - MESSAGE TYPE ACK (5) 6 - ORIGINATOR (1 CHAR) 7,8 - TEXT (4, ACK)	TABLE 14 AUTO ACK
TT SOURCE AC	C C	AU	F

TABLE 5 INITIALIZATION DEFAULT VALUES

OPERATOR ENTRY

		REQUIRED	DEFAULT VALUE					
DMD ADDRESS (3.2.1.3.1)		YES						
DESTINATION ADDRESS (3.2.1.3.2)	S	YES						
TEST/DATA DESIGNAT (3.2.1.3.3)	OR	110	DATA					
SIMPLE/POUBLE BLOC (3.2.1.5.8)	K TRANSMISSION	סינ	SINGLE					
TRAIGHISSION RATE (3.2.2.2)		NO	. 1200					
PREMILE (3.2.1.5.2)		סיו	2.2 Sec					
ADVANCE DELAY (3.2.1.4.1.3)		1.0	.4 Sec					
AUDIBLE SIGNALS (3.2.1.3.8)	KEYDOARD	MO	OFF					
	PESSAGE/ACK/NAX	MO	OFF					

APPENDIX 1

MESSAGE FORMATS FOR USE BY
THE DAID IN TACFIRE

E	C-SS-20	503-TF
7	April	1977

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*CHARACTER FOSITION 8 shall be used to indicate the active fire mission (1 or 2) when the message was transmitted. Transmitted characters ZERO (0), through 6 and letter 0 designate mission Number 1.
Transmitted characters 7 through N designate mission Number 2. See 3.2.1.4.3.2.1.

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32-63 JW 0-31

*CHARACTER POSITION 8 shall be used to indicate the active fire mission (1 or 2) when the message was transmitted. Transmitted characters ZERO (Ø), through 6 and letter 0 designate mission Number 1.

Transmitted characters 7 through N designate mission Number 2. See 3.2.1.4.3.2.1.

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CHARACTER POSITION 8 shall be used to indicate the active fire mission (1 or 2) when the message were fixed was transmitted characters ZERO (8) through 6 designate mission Number.1. Transmitted characters 7 through M designate mission Number 2. See 3.2.1.4.3.2.1.

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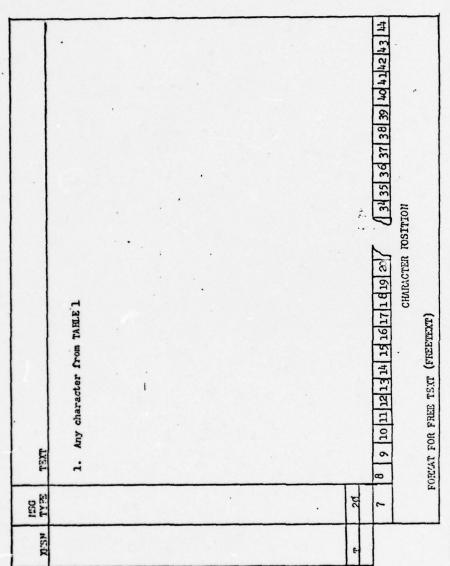
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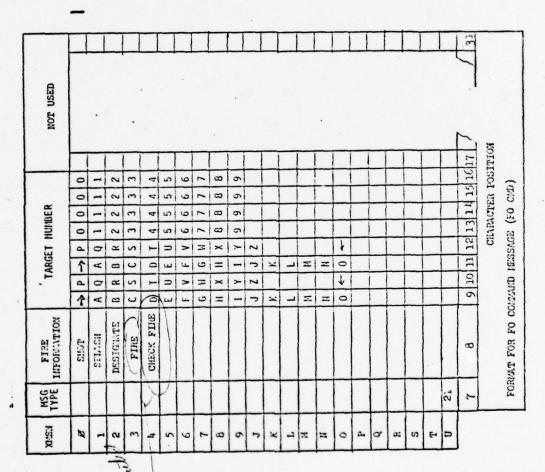
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TARGET * TYPE CHAR	TARGET TYPE ARGUMENT	TARGET * SUBTYPE CHAR	TARGET SUBTYPE ARGUMENT
0	Special (SPECIAL)	ø 1 2 3	Oncall (ON CALL) Illum - 1 Gun (ILL1GUN) Illum - 2 Gun (ILL2CUN) Illum - 2 Gun Deflection Spread
		4	(ILL2GUND) Illum - 2 Gun Range Spread (ILL2GUNR)
		5 6 7	Illum - 4 Gun (ILL/+GUN) Not Used
		7 8 9 J K	Cas-Nonpersistent (GAS NONP) Cas-Persistent (GAS PERS)
		L M-N O	Leaflets (LEAFLET) Not Used Target Type/Subtype-Not Given (N/S)
1	Personnel (PERSONEL)	ø 1 2 3 4	Unknown Infantry Observation Post (OP) Patrol
		5 6- n 0	Work Party (WKPTY) Position Not Used Target Type/Subtype-Not Given (N/G)
2	Weapons (WEAPON)	ø 1 2	Unknown Light Machine Gun (LT M GUN) Antitank Gun (AT GUN) Heavy Machine Gun (HVY MGUN)
		1 2 3 4 5 6-N	Recoiless Rifle (RCLR) Position Not Used Target Type/Subtype-Not Given(N/G)
3	Mortars (MORTAR)	ø 1 2 3 4 5	Unknown Light Medium Heavy Very Heavy (VERY HVI)
		5 6-n 0	Position Not Used Target Type/Subtype-Not Given (N/S
* "ø"	is number ZERO, and "O"	is letter 0 (TABLE 160	

TARGET * TYPE CHAR	TARGET TYPE ARGUMENT	TARGET * SUBTYPE CHAR	TARGET SUBTYPE ARGUMENT	
4	Artillery (ARTY)	ø 1	Unknown Light	1
		1 2 3 4 5	Medium	
		3	Heavy	
		4	Not Used	1
		5	Not Used	
			Position	
		7-N	Not Used	
		0	Target Type/Subtype-Not Given	
		4	Unknown	1
5	Armor (ARMOR)	9	Light	•
		7	Medium	
		2	Heavy	
		Ø 1 2 3 4 5	Armored Personnel Carrier (APC)	
		5	Position	
		6-N	Not Used	
		0	Target Type/Subtype-Not Given	
	(4	Unknown	1
6	Vehicles (VEHICLE)	ø	Light Wheeled (LT WHEEL)	•
		1 2 3 4 5	Heavy Wheeled (HVYWHEEL)	
		2	Reconnaissance (RECON)	
		j,	Boats (EOAT)	
		5	Aircraft	
		6	Helicopter (HELICPIR)	
		7-N	Not Used	
		0	Target Type/Subtype-Not Given	
	/ / (DITTMET)	ø	Unknown	1
7	Rockets/Missiles((RKTMSL)		Antipersonnel (APERS)	•
		2	Light Missile (LT MSL)	
		3	Medium Missile (MDM MSL)	
		1 2 3 4 5	Heavy Missile (HVY MSL)	
		5	Antitank	
		6	Position	
		7-N	Not Used	
		0	Target Type/Subtype-Not Given	

^{* &}quot;p" is number ZERO, and "O" is letter O (TABLE 1).

TARGET * TYPE CHAR	TARGET TYPE ARGUMENT	TARGET * SUBTYPE CHAR	TARGET SUBTYPE ARGUMENT	
8	Supply Dumps (SUPPLY)	ø 1 2 3 4 5 6	Unknown Ammunition (AMMO) Petroleum, Oil (PTL,OIL) Not Used	1
		5 6 7-N 0	Bridging Equipment (BRG EQPT) Class I Class II Not Used Target Type/Subtype-Not Given	
9	Centers (CENTER)	Ø 1 2 3 4 5 6-N	Unknown Small Battalion (EN) Regiment (REGT) Division Forward Not Used Target Type/Subtype-Not Given	1
J	Equipments (EQUIP)	Ø 1 2 3 4 5 6-N 0	Unknown Radar Electronic Warfare (EW) Searchight (SLT) Guidance Loudspeaker (LOUDSPKR) Not Used Target Type/Subtype-Not Given	ı
K	Buildings (BUILDING)	ø 1 2 3 4 5 6-N 0	Unknown Wooden Brick or Stone (MASNRY) Concrete Metal Special Purpose (SPECIAL) Not Used Target Type/Subtype-Not Given	1

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^{* &}quot; ϕ " is number ZERO, and "O" is letter O (TABLE 1).

'ARGET * TYPE CHAR	TARGET TYPE ARGUMENT	TARGET * SUBTYPE CHAR	TARGET SUBTYPE ARGUMENT	
L	Bridges((BRIDGE)	Ø 12 34 56 78 9-N	Unknown Foot Pontoon (FOOT PON) Vehicle Pontoon (VEH PONT) Concrete Wooden Steel Site Raft Ferry Not Used Target Type/Subtype-Not Given	1
М	Terrain Features (TERRAIN)	9 1 2 3 4 5 6 7-N	Unknown Road Junction Hill Defile Landing Strip (LDG STRP) Railroad Not Used Target Type/Subtype-Not Given	1
N	Assembly Areas (ASSEMBLY)	ø 1 2 3 4 5-N	Unknown Troops Troops and Vehicles (TRP & VEH) Mechanized Troops (TRP MECH) Troops and Armor (TRP & ARM) Not Used Target Type/Subtype-Not Given	1
0	Air Defense Artillery (ADA)	Ø 1 2 3 4 5 6-N 0	Unknown Light Medium Heavy Missile Position Not Used Target Type/Subtype-Not Given	1

^{* &}quot;ø" is number ZERO, and "O" is letter O (TABLE 1).

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APPENDIX 2

DEFAULT VALUES, DISPLAY SEQUENCE
FOR ENTRY FIELDS AND REQUIRED ENTRIES
FOR TACFIRE DMD MESSAGES

ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES	•	1	
EASTING	YES		N/A	
NORTHING	YES		N/A	
ALTITUDE	YES		N/A	
GRID ZONE	NO	STD	ø	
DIRECTION	NO	USE GT	N OR O	
TARGET TYPE	NO	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	NO	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RAD/LENGTH	110	NOT GIVEN	0	
WIDTH	NO	NOT GIVEN	0	
ATTITUDE	NO	ø	ø	3.2.1.4.1.6
SH/FZ	NO	NO PREF	ø	
CONTROL	NO	AF	ø	

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

3

ENTRY FIELD AND DISPIAY SEQUENCE	REQUIRED	DEFAULT	CHAR XITD	SEE PARACRAPH
NESSACE TYPE	YES		2	
KNOWN POINT NO.	YES		N/A	
DIRECTION	YES		N/A	
SHIFT	700	NOT GIVEN	0	
RIGHT/LEFT	Yes (1)	NOT GIVEN	0	
ADD/DROP	Yes (1)	NOT GIVEN	0	
UP/DOWN	Yes (1)	NOT GIVEN	0	
TARGET TYPE	ио	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	no	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	NO	NOT GIVEN	ø	
DOP	мо	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	٥	
WIDIH	NO	NOT GIVEN	· ·	
ATTITUDE	NO	ø	ø	3.2.1.4.1.6
SH/FZ	NO	NO PREF	ø	
CONTROL ;	NO	AF	ø	
(1) The magnit is selecte then the m	ude of the d. If NOT agnitude is	shift is required if IVEN is selected for not required.	a shift direc shift direct	tion ion,

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "\$" is number ZERO, and "0" is letter 0 (Table 1).

entry field and dispiny decumice	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPII
NESSAGE TYPE	YES		3	
DIRECTION	YES		N/A	
DISTANCE	YES		N/A	
VERTICAL CORRECTION	-7WB	NOT CIVEN	30	
UP/DOWN METERS	Yes (1)	NOT GIVEN	0	
TARGET TYPE	МО	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STREACTH	NO	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
MIDIH	NO	NOT GIVEN	. 0	
ATTITUDE	NO	ø	ø	3.2.1.4.1.6
SH/FZ	мо	NO PREF	ø	
CONTROL	NO	AF .	ø	
				•
(1) See Page	166			
*	•			

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).



ETRY FIELD				
AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR X-TTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		4	
DIRECTION	YES ·	AS CARRIED FROM 1) FIRE REQUEST OR 2) LAST ADJ WHICHEVER MOST RECENT	N/A	
OBSERVAVILON	то	OK .	\$	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
SHIFT	ИО	NOT GIVEN	0	3.2.1.4.1.7
RIGHT/LEFT	Yes (1)	NOT GIVEN	0	
ADD/DROP	Yes (1)	NOT GIVEN	0	
UP/DOM	Yes (1)	NOT GIVEN	0	
TARGET NUMBER	YES	AS RECEIVED FROM FDC IN MTO OR CARRIED FROM LAST ADJ: OTHERWISE OPERATOR ENTRY	N/A	
SH/FZ	МО	AS CAPRIED FROM 1) FIRE REQUEST OR	N/A	
CONTROL	NO	2) LAST ADJ WHICHEVER MOST RECENT	N/A	•
			•	•
(1) See Page	166.			
	•	i		
				AMENDMENT 16 JULY 1975 PAGE 41 OF 4

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "\$" is number ZERO, and "0" is letter 0 (Table 1).

ENTRY FIELD AND DISPLAY SEQUEICE	REQUIRED	DEFAULT	CHAR X-TD*	SEE FAR
MESSAGE TYPE	YES		5 .	
DIRECTION	YES	AS CARRIED FROM 1) FIRE REQUEST OR 2) LAST ADJ SHICHEVE IS SOST SECTION	N/A	
CONSAID ==	1/10	-1 ROUID	·· = =	
SHIFT	NO	NOT GIVEN	0	3.2.1.4.1.7
RIGHT/LEFT	Yes (1	NOT GIVEN	0	
ADD/DROP	Yes (1	NOT GIVEN	0	
UP/DOWN .	Yes (1	NOT GIVEN	0	
TARGET NU-BER	YES	AS RECEIVED FROM FDC IN MTO OR CARRIED FROM 1) LAST ADJ	N/A	
•		WHICH EVER IS MOST RECENT OTHERWISE OPERATOR ENTRY		
FUZE	NO	NOT CIVEN	· 0	
CONTROL	. NO	AS CARRIED FROM 1) FIRE REQUEST 2) LAST ADJ	N/A	
		WHICHEVER IS MOST RECENT (CONTROL WILL BE CARRIED ONLY IF IT IS ONE OF THE VALID ENTRIES FOR THE CONTROL FIELD IN THE PREC ADJ FORMAT, OTHERWISE IT WILL DEFAULT TO REG AF)		
(1) See Page 16	6.			AMENDMENT 16 JULY 1975 PAGE 42 OF 47

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZENO, and "O" is letter O (Table 1).



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ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PAR
MESSAGE TYPE	YES		5	
DIRECTION	YES	AS CARRIED FROM 1) FIRE REQUEST OR 2) LAST ADJ WHICHEVER IS MOST RECOUNT	N/A	
COMMAND	МО	1 ROUND	1	
SHIFT	NO	NOT GIVEN	0	3.2.1.4.1.7
RIGHT/LEFT	1/0	NOT GIVEN	0	
ADD/DROP	NO	NOT GIVEN	0	
UP/DOWN .	NO	NOT GIVEN	0	
TARGET NUMBER	YES	AS RECEIVED FROM FDC IN MTO OR CARRIED FROM 1) LAST ADJ		
		WHICHAVER IS MOST RECENT OTHERWISE OPERATOR ENTRY		
FUZE	NO	NOT GIVEN	0	
CONTROL	МО	AS CARRIED FROM 1) FIRE REQUEST 2) LAST ADJ WHICHEVER IS MOST RECENT (CONTROL WILL BE CARRIED ONLY IF IT IS ONE OF THE VALID ENTRIES FOR THE CONTROL FIELD IN THE PREC ADJ FORMAT, OTHERWISE IT WILL DEFAULT TO REG AF)	n/a	
				AMENDMENT 16 JULY 1975 PAGE 42 OF 47

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZENO, and "O" is letter O (Table 1).

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ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR X-TTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		6	
REFERENCE DIRECTION	YES	AS CARRIED FROM HB/MPI MESSAGE SENT BY FDC: OTHERWISE OPERATOR ENTRY	n/A	
OBSERVED ERROR	YES		N/A	
REFERENCE VERTICAL ANGLE		AS CARRIED FROM HB/MPI MESSAGE SENT BY FDC: OTHERWISE OPERATOR ENTRY	N/A	
DIRECTION ERROR	NO	NOT GIVEN	0	
OBS VERT ANGLE	NO	AS CARRIED FROM HB/MPE MSG SENT FROM FDC: OTHERWISE "YES"	Ø	
VERTICLE ANGLE ERROR	Ю	NOT GIVEN	0	
TARGET NUMBER	YES	AS CARRIED FROM HB/IPI MESSAGE SENT BY FDC: OTHERWISE OPERATOR ENTRY	N/A	
OBSERVATION	NO	ок	ø	
REG & VERT ANGLE	YES		N/A	
REG & VERT ANGLE	YES		N/A	

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

FORMAT #7 END OF MISSION AND SURVEILLANCE MESSAGE

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ENTRY FIELD AND DISPINY SEQUENCE	REQUIRED	DEFAULT	CHAR X-TTD*	SEE PAIMGRAPH
NESSAGE TYPE	YES		7	
DIRECTION	NO .	AS CARRIED FROM FIRE REQUEST OR ADJ WHICHEVER LAST USED: OTHERWISE USE GT	N/A (USE GT:O)	
SHIFT	NO.	NOT GIVEN	70	3.2.1.4.1.7
RIGHT/LEFT	Yes (1)	NOT GIVEN	0	
ADD/DROP	Yes (1)	NOT CIVEN	0	
TARGET TYPE	МО	AS CARRIED FROM FIRE REQUEST OTHERWISE: PERSONNEL	n/A (Personnal:1)	3.2.1.4.1.8
TARGET SUBTYPE	NO	AS CARRIED FROM FIRE REQUEST OTHERWISE: NOT GIVEN	N/A (NT GVN:0)	3.2.1.4.1.8
CAS	NO	NOT CEVEN	ø	
TARGET MUNBER	YES	AS CARRIED FROM MIDO OR ADJ WHICHEVER LAST USED: OTHERWISE OPERATOR ENTRY	N/A	4
CONTROL	NO	EOM		
See Page 166.	_			
				AMENIMENT 16 JULY 1975 PAGE 13 OF 17

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "\$" is number ZENO, and "O" is letter 0 (Table 1).

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FORMAT #8 FRONT LINE TRACE MESSAGE

ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		8	
ENTRY NUMBER	YES		N/A	
EASTING	YES		N/A	
NORTHING	YES		N/A	
ENTRY NUMBER	110	NOT GIVEN	0	
EASTING	YES - IF 2nd ENTRY NOT USED	IF 2nd ENTRY IS NOT GIVEN SEND ALL Øs	N/A	
NORTHING				
GRID ZONE	NO	STD	ø	

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry mode by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

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ENTRY FIELD AND DISPLAY SECURICE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		9	
DIRECTION	YES		N/A	
EASTING	YES		N/A	
IDEMILIG	YES		N/A	
GRID ZONE	МО	STD	ø	
WEAPON TYPE	YES		N/A	•
SUB TYPE 1	NO	ONK .	ø	
CALIBER	YES		N/A	
ROUNDS	NO	NOT GIVEN	ø	
TDE	YES		N/A	

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter 0 (Table 1).

ENTRY FIELD AND DISPLAY SECUTION	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		J	
PASTEIG	YES	•	N/A	
NOMEHING	YES		N/A	
ALTITUDE	NO	NOT GIVEN	0	
GRID ZONE	NO	STD	ø	
TARGET TYPE	NO	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	NO	NOT GIVEN	0	
DEGREE OF PROTECTION	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
WIDIH	NO	NOT GIVEN	0	
ATTITUDE	NO	ø.	ø	3.2.1.4.1.6
RELIABILITY	NO	NOT GIVEN	0	
MSG SUBTYPE **	YES			
** This field is not di	splayed.			

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. " ϕ " is number ZERO, and "0" is letter 0 (Table 1).

	ENTRY FIELD AND DISPINY SEQUENCE	REQUIRED	DEFAULT	CHAR XITD*	SEE PARAGRAPII
	MESSAGE TYPE	YES		J.	
	MESSAGE SUBTYPE **	YES		1	
	LATITUDE	YES		N/A	
	LONGITUDE	YES		N/A	
_	Sequence Ho.	YES		N/A	
			•		
	** This field is not di	splayed			
	1110 22014 10 1100 42	,-,-,-			

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

The second secon

ENTRY FIELD AND DISPIAY SECURICE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		J	
SEQUENCE NO	YES		N/A	
ALTITUDE	NO	NOT GIVEN	0	
TARGET TYPE	NO	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	NO	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
WIDTH	МО	NOT GIVEN	0	
ATTITUDE	NO	ø	ø	3.2.1.4.1.6
RELIABILITY	NO	NOT GIVEN	0	
MESSAGE SUBTYPE **	YES		2	
** This field is not d	isplayed.			

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

ENTRY FIELD AND DISPMAY SEQUENCE	REQUIRED	DEFAULT	CHAR XI-TTD*	SEE PAPAGRAPH
MESSAGE TYPE	YES		κ	
DIRECTION	YES		N/A	
DISTANCE	YES		N/A	
VERTICAL CORRECTION	110	NOL CIAEM	0	
UP/DOWN	Yes (1)	NOT GIVEN	0	
TARGET TYPE	МО	PERSONNEL	1	3.2.1.4.1.8
TARCET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	МО	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
WIDTH	NO	NOT GIVEN	. 0	
ATTITUDE	по	ø	. ø	3-2-1-4-1.6
RELIABILITY	NO	NOT GIVEN	0	
(1) See Page 1	66.			

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "p" is number ZERO, and "O" is letter 0 (Table 1).

ENTRY FIELD AND DISPLAY SECUTICE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		к	
DIRECTION	YES		N/A	
DISTANCE	YES		N/A	
VERTICAL CORRECTION	NO	NOT GIVEN	0	
UP/DOWN	NO	NOT GIVEN	0	
TARGET TYPE	NO	PERSONNEL	1	3.2.1.4.1.8
TARGET SUBTYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	NO	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
WIDTH	NO	NOT GIVEN	0	
ATTITUDE	NO	ø	ø	3.2.1.4.1.6
RELIABILITY	NO	NOT GIVEN	0	

^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter O (Table 1).

ENTRY FIELD AND DISPIAY SECURICE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES	•	L	
KNOWN POINT NO 1	YES		N/A	
TARGET NUMBER	YES 2	ACTIVE MISSION ing.	n/a	
•				

The following entries shall be made for the dynamic default values associated with the active FIFE MISSION sequence when (1) a known point number is entered, (2) FIRE FFF is entered, or (3) FIRE TOT NO is entered.

DIRECTION USE GT
TARGET TYPE PERSONNEL
TARGET SUBTYPE NOT GIVEN
SH/FZ NO PREF
CONTROL AF

Entry of ASSIGN KNPT shall not affect the existing entries for the dynamic default values associated with the active FIRE MISSION SEQUENCE.

This is a required entry if (1) ASSIGN KNOWN POINT or (2) FIRE TARGET NUMBER is entered in KNOWN POINT NO, otherwise it is not a required entry.

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^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "Ø" is number ZERO, and "O" is letter 0 (Table 1).

EMTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR X-ITD*	see Paragraph
MESSAGE TYPE	YES		М	
EASTING	YES		N/A	
NORTHING	YES		N/A	
ALTITUDE	NO	NOT GIVEN	ø	
GRID ZONE	NO	STD	ø	

^{1/}A in character transmitted is used for required entries. The actual character ransmitted will depend on the entry made by the operator. "Ø" is number ZERO, and O" is letter O (Table 1).

ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		N	
EASTING	YES		N/A	
NORTHING	YES		N/A	
ALTITUDE	YES		N/A	
OBSN	YES		N/A	
TARGET NO	YES		N/A	
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ENTRY FIELD AND DISPLAY SECUENCE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		વ	
DIRECTION	YES		N/A	
SIANT DISTANCE	YES		N/A	
SLANT ANGLE	YES		N/A	
TYPE MISSION	NO	STATIONARY TARGET	ø	
POINT NUMBER	YES if TRILAT is entered in TYPE MISSION otherwise NO	This field is displayed to the operator only if TRILAT is entered in TYPE MISSION	M/A if displayed otherwise O	
TARGET TYPE	МО	PERSONNEL	ı	3.2.1.4.1.8
TARGET SUB TYPE	NO	NOT GIVEN	0	3.2.1.4.1.8
STRENGTH	МО	NOT GIVEN	ø	
DOP	NO	NOT GIVEN	6	
RADIUS/LENGTH	NO	NOT GIVEN	0	
WIDTH	NO	NOT GIVEN	0	
ATTITUDE	NO	ø	Ø	3.2.1.4.1.6
SHELL/FUZE	NO	NO PREF	ø	
CONTROL	NO	AF '	ø	
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EMTRY FIELD AND DISPLAY SECURICE	REQUIRED	DEFAULT	CHAR XXTD*	SEE PARAGRAPH
NESSAGE TYPE	YES		R	
DIRECTION	YES	AS CARRIED FROM	N/A	
		1) FR - LASER 2) SUB ADJ LASER OR 3) NEW LASER READ OUT WHICHEVER IS MOST RECENT		
SLANT DISTANCE	YES		N/A	
SLANT ANGLE	YES		N/A	
OBSERVATION	NO	OK - BURST	1	
TARGET NUMBER	YES	AS RECEIVED FROM FDC IN MTO OR LAST PRIOR ADJ OTHERWISE OPERATOR ENTRY		
			N/A	
SHELL/FUZE	NO	AS CARRIED FROM 1) FIRE REQUEST	N/A	
CONTROL	NO	2) LAST ADJ	N/A	
		WHICHEVER IS MOST RECENT		
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^{*} N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator. "\$\psi\$" is number ZERO, and "0" is letter 0 (Table 1).

			r	
ENTRY FIELD AND DISPLAY SECURICE	REQUIRED	DEFAULT	CHAR XMTD*	SEE PARAGRAPH
MESSAGE TYPE	YES		S	
TARGET NUMBER	YES 🗲 🕳	only thing passed	N/A	
ADJUSTING UNIT TO FIRE	YES	to Depraine 2	Daniel Je	
NUMBER OF VOL	YES		N/A	
NUMBER OF UNITS	YES		N/A	
PROBABLE ERROR	NO	NOT GIVEN	0	
ADJ SHELL/FUZE	YES		N/A	
SHELL/FUZE 1ST VOL	YES		N/A	
SHELL/FUZE SUB VOL	YES	•	N/A	
METHOD OF ENGAGEMENT	YES		N/A	
CONTROL	YES		N/A	
TIME OF FLIGHT	YES	-	N/A	
ANGLE T	110	NOT GIVEN	0	
FIRE MISSION BUFFER	NO	NOT GIVEN	ø	
		Defauet Bay 1. Tat No 2. Dissection 3. Tat Type Sub tupe 4 Shell Fb 5 Cont	fer.	

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ENTRY FIELD AND DISPIAY SEQUENCE	REQUIRED	DEFAULT	CHAR XMTD*	see Paracraph
MESSAGE TYPE	YES		T	
TEXT	YES		n/A	
*				

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ENTRY FIELD AND DISPLAY SEQUENCE	REQUIRED	DEFAULT	CIMR X-ITD*	SEE PARAGRAPH
MESSAGE TYPE	YES		ŭ	
COMAND THE	YES		N/A	
TARGET NUMBER	YES	AS CARRIED FROM 1) MESSAGE TO OBSERVER 2) LAST ADJ	N/A	
		whichever is most recent otherwise operator entry		
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N/A in character transmitted is used for required entries. The actual character transmitted will depend on the entry made by the operator.

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